1963

Factor Analysis of MMPI, H-K PGR Test, and TAT: Three Factors of Inappropriate Reaction

Robert E. Hoene
Loyola University Chicago

FACTOR ANALYSIS OF MMPI, H-K PGR TEST, AND TAT: THREE FACTORS OF INAPPROPRIATE REACTION

BY

ROBERT E. HOENE, S. J.

A Dissertation Submitted to the Faculty of the Graduate School of Loyola University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

June, 1963

OUTLINE TABLE OF CONTENTS

CHAPTER I

STATEMENT OF PROBLEM

A. HYPOTHESIS.

Do people handle their difficulties poorly in three major, characteristic ways? It can be hypothesized that they may internalize the difficulty which they face, blame themselves, even "excoriate" themselves. Others may habitually act out, blaming other people for their troubles, and even take aggressive measures of psychopathic proportions. Still others may run away from the difficulty or develop extreme anxiety in facing a situation and even deny the reality of the situation, which, done consistently enough, demands that such persons live in a dream world.

Such a hypothesis comes very close to that of S. Rosenzweig (1934), who speaks of:

> . . . the hope of discovering a classification of apperceptive types of conscious reaction to frustration that will serve as the basis for further, possibly experimental, research. If the attempt is made to describe the typical modes of conscious reaction to frustration, one possible result is that summarized in the accompanying table.

Apperceptive types of conscious reaction to frustration:

	Extra-punitive	Intro-punitive	Im-punitive
Emotions	Anger and indignation	Humiliation and guilt	Embarrassment and shame
Judgments	Blames others: "You played me dirty. I'll get you for that."	Blames self: "How could I have done a thing like that! I'll never forgive myself."	Condones: "It couldn't be helped. Let bygones be bygones."

However, in place of Rosenzweig's use of"apperception" and "memory", the importance of estimation and the estimative sense is here proposed, and in place of "frustration" the more general situation of reaction to difficulties is set forth. The exploration of "types of reaction" and of persons who characteristically react so that they develop a definite kind of personality could be readily accomplished through some sort of factor analysis. Guilford (1959) has shown many possibilities of doing just this. Measures or tests sufficient to reveal the traits must be applied, and, if three or more factors are hypothesized, scales or subtests beyond the number of twelve must be applied. The measures proposed for this analysis are the MMPI,

the Herr-Kobler PGR Test, and the TAT scored in the Story Sequence Analysis. There are a number of scales available for the MMPI, but scales for TAT and H-K PGR must be developed and put to work in accomplishing this factor analysis. The possibility of relating the MMPI with the H-K PGR, a physiologically measured test, rests upon the correlation established by the author in previous research (Master's Thesis, Loyola U., 1962). The TAT, a projective test, is introduced to fill in areas of attitude and emotionality not easily discerned and measured through MMPI and H-K PGR by themselves.

The factor analysis, to be complete, must identify the factors as well as separate them or locate them. The hypothesis proposes simple structure revealing three types of maladjusted individuals. Such emerging structure will be a sign and measure of significance. Psychology theory underlying the analysis plays a commanding role in guiding this process of identification of factors. Once identified or "interpreted", the factors ought to apply in greater or lesser extent to the subjects tested. Working with each factor, one at a time, through one or two scales loaded in the factor, a discriminant analysis can be run to order or score each

and every subject, in reference to the factor and its "intensity". The discriminant function takes all the scales and all the subjects into consideration in assigning the I scores. Four times run, using each of the four factors, the results would make up the beginnings of a multi-dimensional scaling, and should help answer the question concerning the position of any one subject or her location in the multi-dimensional space.

The steps, in brief, are (1) theory concerning hypothesized personality types and factors; (2) literature concerning the battery of tests selected for use, with the particular scales of advantage in factor analysis; (3) methodology concerning the factor analysis and discriminant function as applicable to the data; and (4) the results and their significance.

B. PERSONALITY THEORY RELATED TO HYPOTHESIS

1. Function of Theory in Science

Since the objective of this research is that of verifying several hypotheses and of relating these to a more general theory, the statement of just what is meant by theory has real significance. The author whom I intend to quote has discussed this question of theory repeatedly and in great detail. Speaking of method in

science, he mentions that it is "both a method of discovery and a method of reasoning and verification." The latter, or method of proof, must be distinguished as proof of facts, of laws, and of theories. "Proofs of fact have a peculiar position in science; for it is not so much the occurrence of a single event that is to be proved, but rather of the event as instance of a type, and of this kind of fact the easiest sort of proof is another event of the same type." He goes on to say that "The proof of a general law can only be the inductive reasoning and generalization that led to its original formulation, or some repetition of that reasoning." (Klubertanz, 1955).

> Note the nature of scientific theory. It does not arise from facts distinct from those which give rise to the laws. The process is not one of generalization, even though a theory always is very general and inclusive. Nor is the theory induced from the facts or the laws. It is constructed and imposed on the laws and facts. First of all, a theory is the product of a creative imagination; someone had to imagine the universe in a geocentric pattern, and endow the enclosed space with inherent characteristics -- that of being "home" for a certain kind of body. This image or model was then employed to unify the various facts and laws already known about the location and movements of bodies. The theory had to be internally consistent; for example, the natural presence of earthy matter away from the center could not be allowed. Without consistency a theory cannot even be conceived as a possible explanation. In addition to internal consistency, three relations

are necessary.

(1) The theory must take account of all the relevant data and laws.

(2) Its relation to experience and/or experiment has to be able to be clearly pointed out (the "epistemic relation" of Margenau (5).

(3) It has to be fruitful, in the sense that it can suggest new observations and experiments, and predict results. . .

A scientific theory is a rational explanation of observed fact, such that, if the theory be granted, the data follow by way of logically necessary implication (6). This explanation may be a model which is drawn from other areas (of experience or reason), an abstract symbol, an operational definition, or a real trait selected as a clue to other characteristics. These "explanatory" factors are considered by the mind to be the originating source of the observed behavior, experimental results, classifiable similarities, etc. The purpose of such a constructed factor is to provide an intelligible explanation, to unify large masses of data, and to stimulate and predict. . . (Klubertanz, 1955).

2. Hierarchical Personality Theory: Eysenck and Gasson.

Relying on the distinctions of the foregoing discussion, we will make bold to say that our general attempt in psychology is to attain a perinoetic or empiriological knowledge of the personality.

Personality is an abstract word meaning that by which a person is a person. Person, philosophically considered, is a supposit which has a rational nature. Personality, philosophically considered, is the act of

existing exercised by (and proportioned to) an individual possessing a rational or intellectual nature. Psychological personality is a group or memory-system of experiences, attitudes, and ideas linked together by possible recall and related to present actual experiences.

> The value and function of this psychological evidence (from analysis of "split Personality", personality changes after certain illnesses or injuries, and the experience of distraction and conflict) is that the unity of man is to be found at two levels. By being born with a human nature, a man has substantial unity. But that unity is such as to permit a certain multiplicity of action, attitude, memory and so forth. A man may progress toward greater unity of life and action; he may regress toward greater multiplicity. Therefore, complete unity is an ideal of a mature character, not simply something given us by nature. (Klubertanz, 1953).

A couple formulations of general personality theory are now in place, to be followed by several experiential formulations.

3. Eysenck's Four Levels.

Eysenck (1960), leaving behind his earlier system as related in Hall & Lindzey (1957), and discussing "levels of personality, constitutional factors, and social influences," integrates constitutional factors, learning theory and personality theory into a stratified system in which there are four main levels, all con-

ceived as being casually related to each other in hierarchical order.

Level 1, the most fundamental, is physiologically determined; refers to some constitutional property of the individual's nervous system.

Level 2, is that of observable experimental (laboratory) phenomena, such as eyeblink conditioning or figural after-effects.

Level 3, is that of objectively observable primary personality traits, such as sociability and activity.

Level 4, is that of observable attitudinal phenomena, such as ethnocentrism and hedonism.

This formulation of Eysenck points towards that hierarchical system indicated in the next paragraphs.

4. Gasson: "Conscious" and "The Normal".

For a succinct summary of a personality theory which will be useful for the assessment of MMPI, TAT and PGR test results, and from which questions may be drawn for the examining of possible relationships, Gasson's (1954) contribution stands forth:

> We have endeavored to work out a theory which is comprehensive and will apply to the behavior of ordinary human beings who are psychologically well, though it also provides some account of the behavior of persons who are psychologically

> not well. Our primary hypothesis has been that powers and capacities of the human being are natively designed to work in harmony and order to bring the person to that condition of development and self-realization that is proper to each single individual; second, that these powers are active in character and are not merely components of a passive reactive system; and third, that the human being is self-determined and must attain the goal of perfect self-actualization by deliberate control and direction of himself and his activities. We did not adopt these hypotheses arbitrarily. They are the result of scientific observation, personal and historical, of human beings in action.

He begins the formulation:

> . . . by making explicit the concepts that comprise our basic systematic outlook . . . Our first postulate is that of epistemological realism, a moderate and immediate realism. . . We can find it justified elsewhere and so need not establish its validity here. . . Our second . . . is that the person is an original unit; that is, a single undivided substance, distinct from other substantial units in the universe. . . Third, we maintain that the human person is different in kind from other living organisms, not merely more complicated or more highly differentiated. . . We suppose, then, that there is an essential difference between spontaneity and self-determination . . . Lastly, we assume that the lower orders of organization are present in higher organisms virtually but not actually or formally.
>
> Summary of Major Theoretical Propositions:
>
> 1. Psychologically, personality is the patterned totality of human powers, activities and habits, uniquely organized by the person in the active pursuit of his self-ideal, and revealed in his behavior.
>
> 2. The capacities or powers of a human being

are hierarchical and active in nature; upon presentation of their specific object, they are capable of initiating action.

3. The active nature of these powers impels and urges the person (when the necessary conditions are provided) not only to be active in pursuing their specific objectives but also to do so in an ordered and coordinated way. The function and nature of impulse and urge are unconscious, though they can become known by formal reflection and reasoning.

4. Human powers have a bimodal way of natural action: toward possession of external reality, and toward actuation of the self by stabilizing possessions; hence in their integrated action they constitute a natural tendency in the person toward possession and toward self-actuation in possession.

5. The prime factor in integrated action is the will, or the capacity of self-determined action. Like the other capacities, it has a natural and unconscious way of acting. For fully integrated personality, there must be active and deliberate ordering not only of concrete actions but also of the total behavior pattern.

6. The rationale of this order is the self-ideal.

7. For proper integration, the self-ideal as it is must approximate closely the self-ideal as it ought to be for any given individual; if it does not, there will be internal disturbance which may be called conflict.

8. The externally perceptible organization of a person's activities, habits and powers, as they go toward a self-ideal, is called the personality structure.

9. At the root of this structure there is unity, not conflict. Impulse, heightened to urge, makes it possible for the person to deal with a difficulty, whether internal or external.

> 10. Conflict arises from inconsistent choice, or from incompatibility of the chosen goal with the natural order of things. This incompatibility may not be recognized, or it may be recognized but not connected with the disturbance. Only in this sense can psychological conflict be called unconscious.

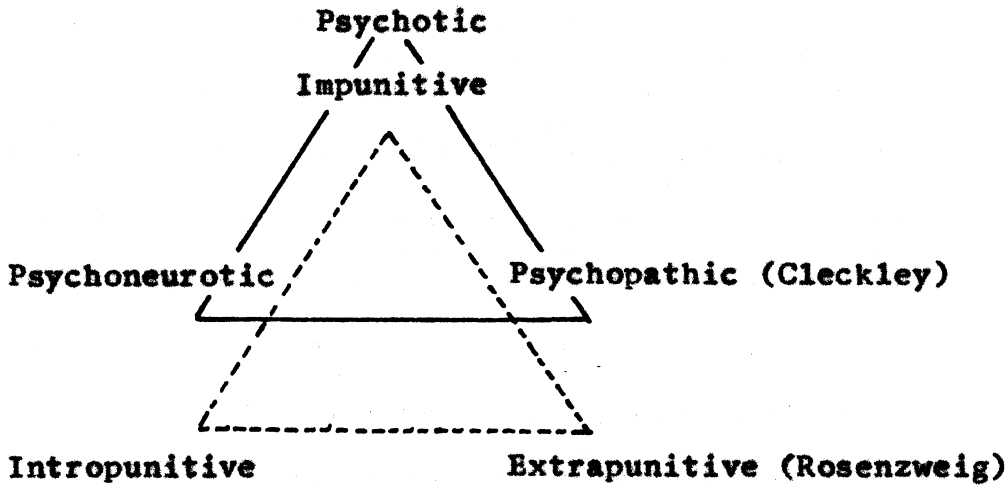
5. Three Dimensional Theory.

Having talked of personality and an over-all definition and having outlined a general theory of personality, the possibility of laying out a three dimensional scheme, with the "normal" personality in the large central area, occurs to this writer through a summary of Cleckley (1960). This three dimensional formulation does not differ greatly from Rosenzweig's (1934) proposal for three apperceptive types of conscious reaction to frustration already mentioned.

In the American Handbook of Psychiatry, Cleckley has given a clear picture of the psychopath, and at the end of his article he lays down this three-fold classification:

> If means became available of obtaining adequate control over psychopaths who plainly show themselves not fitted for unrestricted freedom in the social group, it would be possible to set up facilities specifically designed to deal with their problems. Our large state and federal psychiatric institutions, organized for the treatment of patients psychotic in the traditional sense, are not well adapted to handle the

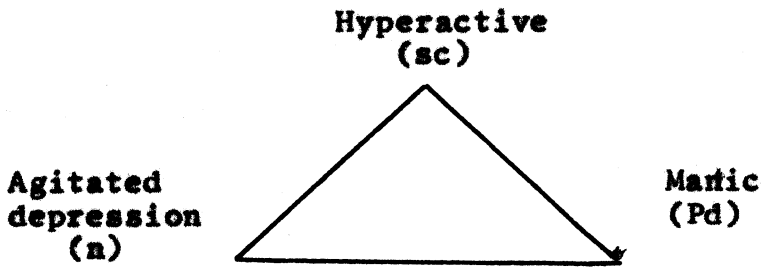
psychopath. The numerous private hospitals primarily designed for the needs of psychoneurotic patients lack the means of restraining him and are unable to deal adequately with the problems he creates. The establishment of institutions primarily for psychopaths would not be advisable until legal means of controlling them are available. The expense of building and operating specialized institutions of this sort would be large. There is good reason to believe, however, that it would be far less than what the psychopath is costing the public today. (Cleckley, 1960).



Rose Spiegel, M.D., in The American Handbook of Psychiatry, makes an analysis of three types of active states, based on her experience with abnormals:

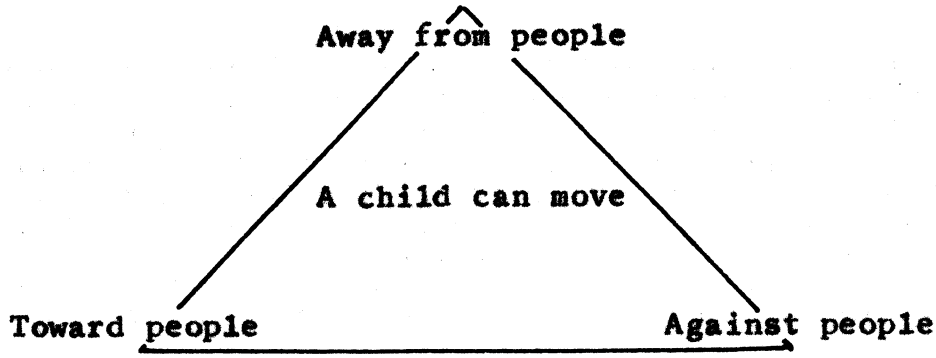
The manic patient, state Lewis and Piotrowski, "absorbs the world around him passionately," whereas the hyperactive schizophrenic "more or less ignores the world." The manic patient,

however, despite his verbal flow, does not relate to others as receiver of their communication, and he tends to impose his verbal communication on others. In these respects his interpersonal communication is faulty. Nor does he subject his thinking or language to the scrutiny of judgment - - a defect in relatedness to himself. In agitated depression the person is absorbed in a nihilistic preoccupation which cuts him off from free relatedness to the world, other people, and himself. Whether or not his verbal production is accelerated, it is hardly a free exchange with others; the symbolism, whether expressed in subjective or projected terms, is nihilistic. In both the manic phase and agitation, empathic exchange is diminished, perhaps even more than in simple retardation. (Spiegel, 1960)



(Spiegel)

Horney (1945) contends that "the conflict born of incompatible attitudes constitutes the core of neurosis and therefore deserves to be called basic." "In each of these three attitudes (neurotic), one of the elements involved in basic anxiety is overemphasized helplessness in the first, hostility in the second, and isolation in the third."



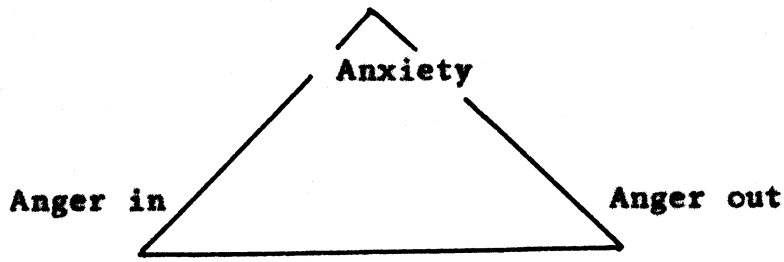
(Horney)

6. Arnold: Emotion Following Estimation.

Arnold (1960) discusses three reactive dimensions emerging from a physiologically based Harvard study:

> The most promising examples of the second type of measurement are the studies of Funkenstein, King and Drolette (1953), and of Ax (1951). . . These investigators measured a number of physiological changes during "anger out" (anger), "anger in" (self-blame), and "anxiety" (fear). These were genuine emotions aroused when the subjects found themselves unable to solve a series of difficult problems and the experimenter berated them for their poor performance. The physiological changes included changes in heart rate, ballistocardiogram, blood pressure, finger and face temperature, and the like. There was a clearly different pattern of physiological changes in each of the three emotions. "Anger in" showed the same changes as "anxiety", only in milder form, while "anger out" showed changes in the opposite direction. Since some of the men characteristically reacted to

ambiguous situations with anger while others tended to blame themselves and still others became apprehensive, these studies also demonstrate that there are habitual patterns of emotional reaction that are characteristic for a given individual. The typical reaction of neurotics was fear ("anxiety").



(Funkenstein, King & Drolette)

7. Three Dimensional Domain Through the Battery of Tests.

In the section on Psychological Research Related to Emotion, Arnold continues:

> Since emotions influence rational appraisal and action, the judgment a person makes and the attitudes he develops will include emotional factors: personality tests of various kinds will tap emotional differences. But the individual differences in the emotions described or expressed will necessarily be less important for personality evaluation than the way in which they are integrated into action. It is not nearly so important to discover whether a man feels anger or fear or love than it is to find out what arouses his ire, what makes him afraid, and what kindles his enthusiasm; and finally, to see to what actions these emotions inspire him. Such data can be obtained through questionnaire methods, like the MMPI or the Bell

> adjustment tests, which are sufficiently accurate for diagnosis of maladjustment or neurosis. But to predict and, still better, to understand an individual's actions, to discover the motives behind his action, projective tests are far more adequate. (Arnold, 1960).

In keeping with these formulations of hierarchical and three dimensional theory, a factor analysis is appropriate, and in keeping with the specific three dimensional system outlined, the MMPI is used to fit and test Cleckley's and Horney's dimensions, the H-K PGR is employed to check out Ax's,and Funkenstein, King and Drolette's dimensions, and a projective test, the TAT, is brought in to meet Rosenzweig's and Arnold's criteria. This battery would appear appropriate to help map the domain hypothesized.

To continue and conclude the discussion of experiential formulations within personality theory, Welsh, Cattell and Guilford will be mentioned. Dahlstrom & Welsh (1960) present this summary:

> Welsh's A
> In his review of the factor studies carried out before 1954, Welsh (1956b) pointed out that all analyses had identified at least two main sources of variance running through the basic clinical scales on the MMPI. In his own work, the first

major source of variance was identified as factor A, having high loadings from scales 7 (Pt) and 8 (Sc) and high but negative loadings from the K scale. This source of variance (not identified in Diamond's apriori analysis of the clinical syndromes used in deriving the MMPI) appears to be personal discomfort or distress. Welsh described it as anxiety, or general emotional upset. Some writers (e.g. Morris, 1947) working with mean profiles of diagnostically heterogeneous groups have indicated that the only source of variance in the MMPI profile is a general degree of disturbance. From the pervasiveness of the variance in factor A, it appears likely that averaging out other variations in such group comparisons will leave only this variation in the mean profiles. Welsh devised his A scale (see Appendix I) to measure this source of personality variance.

Welsh's R

Welsh labeled the second source of variance that he identified in the basic scales of the MMPI as factor R. This factor also seemed to correspond closely to the findings of previous workers. The first three scales, 1, 2 and 3, all showed moderate loadings on factor R, with scale 9 having a moderate but negative loading. This source of variance appeared to relate to a dependence upon mechanisms of denial and rationalization and to a lack of effective self-insight. Except for Diamond's inclusion of the psychasthenia component, this combination resembles his grouping labeled "social dependency". Welsh developed the R scale to measure this second-factor variance.

Excellent confirmation for the work of Welsh in his factoring of the common matrix and his development of the factor scales has recently come from the findings of Kassebaum, Couch and Slater (1959). Working with an elderly population in a gerontological project in New England, they intercorrelated the scores from a list of 32 scales of the MMPI including the A and R scales. In

their rotation to simple structure they found that the A scale had the third highest loading (exceeded only by scales 7 and 8) and by far the purest pattern of loadings on the first factor. The R scale, similarly, had its highest loading on the second factor, with only trivial loadings on two other factors. (These writers interpreted the R scale as introversion, however, rather than repression.) Additional support is found in a study by Fisher (1957) of male V.A. patients in the medical and psychiatric wards. In this analysis both the A and R scales were virtually independent and relatively pure measures of two pervasive sources of variance among the basic MMPI scales.

By means of A and R scale combinations, Welsh (1956b) has shown that groups can be formed with considerable homogeneity in code and profile patterns. This homogeneity reflects the amount of variance in the basic scales themselves that is summarized in these two scales. However, there remains a large amount of important variation in each of the clinical scales that is common to some but not all the other scales in the test. These sources of variation cannot be ignored in the utilization and interpretation of the regular MMPI profile. Some preliminary work on these additional sources of variance has been carried out by Welsh in the derivation of the factor scales C and P. Further investigation of the nature of these sources of variation requires the addition to the factor matrix of carefully selected variables that relate to particular criterion characteristics of the scale but bear little relationship to other components of the basic MMPI scales.

Welsh's C

Welsh (1954) developed a control scale using a method that resembles in some ways the cluster-analytic approach used by Block. Welsh, however, employed more formal factor-analytic methods in his original treatment of the dimensional analysis.

He then used cases selected for their specific score patterns in forming extreme groups on this dimension and carried out an item analysis as he did for his A and R factor scales. The third factor scale he labeled lack of control (see the C scale in Appendix I) after examination of its patterns of factor loadings from other clinical scales and from initial clinical data on cases scoring at the extremes of the C scale distribution.

Welsh's Fourth Factor

The fourth factor scale of Welsh (1954) was established in a series of steps from the scales most typically reflecting psychoticism (see the discussion of configural patterns below), that is, scales 4, 6 and 8. From factor loadings, item content and other preliminary findings on this scale, Welsh labeled this dimension psychoticism (see the P scale in Appendix I). Although additional work on this scale is needed in its clinical validation, the P scale also appears to be a promising index of contact with reality.

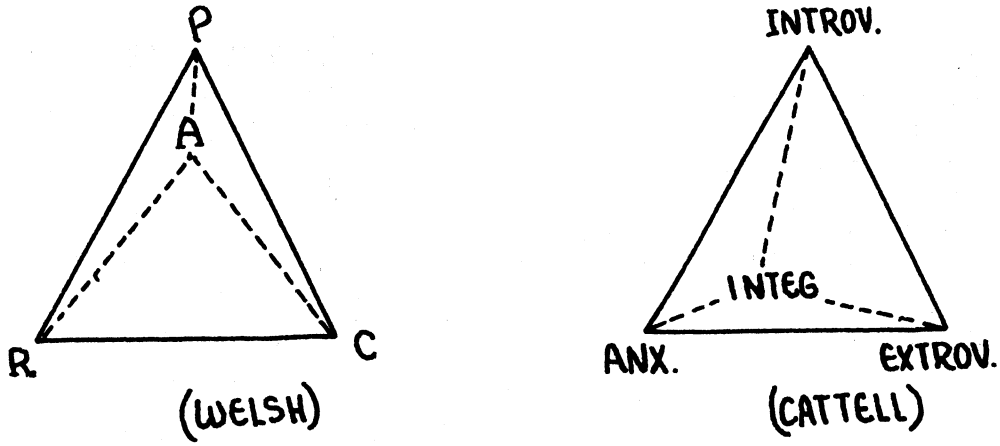
The value of R can be used to evaluate the expression of irritation, insecurities and the like. In combination with the A scale, it can provide insight into the degree of the subject's disturbance and his characteristic manner of showing these feelings. (Dahlstrom & Welsh, 1960).

Cattell (1962) has found two second-order factors at work within his "16 P.F. Test". The first is anxiety vs. integration, and the second is Introversion-Extraversion. The name introversion is also called

general schizothymia.

> It will be observed that the anxiety hysteria syndrome seems to be essentially a profile high on the factors found in the second-order anxiety factor. It is thus indistinguishable as a trait-from high anxiety as a state though auxiliary clinical evidence will doubtless show the difference of anxiety hysteria from anxiety neurosis, and of both from situational anxiety.
>
> The general superiority of objective and analytical measures of this kind in clinical diagnosis and therapy over intuitive, non-quantitative methods alone, has been conclusively shown by such clinical researchers as Meehl (1954) and Eysenck (1953). However, the use of factor-definite anxiety and neuroticism measures is altogether too recent for any range of clinical findings to have reached publications. (Cattell & Stice, 1957 & 1962).

By an analysis of the parts going into the structures of personality factors, the anxiety factor of Cattell would better correspond, it would seem, with Welsh's R (introversion) factor than with his A, or anxiety factor. Again, the general schizothyme or introversion factor of Cattell would go better with the A and P factors of Welsh than with the R (repression or introversion) factor. Probably the extroversion and the lack of control factors of each would go together.



8. The Factor Model of Personality.

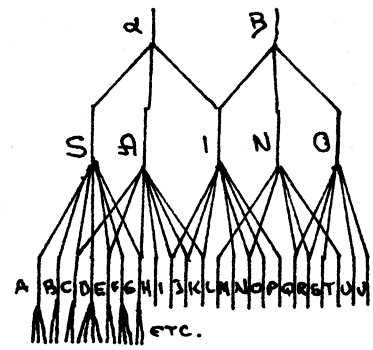
Guilford (1959), who says that "personality can be defined as a person's unique pattern of traits," and that "a trait is any relatively enduring way in which a person differs from others," has written a whole book on Personality from the factor-analytic viewpoint. In the Preface he says: "As a single, logical model for unifying the facts of individual differences, there is at present no rival to the model provided by factor theory . . . The factor model lends itself also to the development of a generalized picture of personality structure for individuals. The picture of personality as a hierarchy of traits is presented in Chapter 5."

Guilford mentions a difficulty:

> The dimensions often have psychological significance as variables of some sort. If a factor fits into such a system it is believed to have superior claim to psychological

meaningfulness.

Such systems also give us glimpses of personality structure. Factor analysis has thus far revealed a multitude of basic variables of individual differences, and this multitude of factors is beginning to take shape in terms of logical systems. We have no very good way of estimating the amount of correlation between factor variables, but this is an important step if we are to develop a picture, based upon empirical evidence, of the general structure of personality in a population. Snatches of such information are given in the last five chapters.



e.g.

S - sociability

A - ascendance

I - confidence

N - composure

O - objectivity

- social adjustment

B - emotional adjustment

Diagram showing how personality structure can be conceived as a hierarchy of traits at different levels of generality. (Guilford, 1959)

> At which level in the hierarchy do the obtained factors belong? This question has not been given sufficient consideration in previous investigations. Earlier discussions have favored the logical association of factors and primary traits, because in the majority of factor-analytic investigations, the experimental variables have been at the hexis level. This statement implies a general principle. Factors will ordinarily be at the level just above the level of the descriptive variables that are intercorrelated. Traits like alpha and beta would arise from analysis of measurements taken at the primary-trait level. We have in the figure above only a segment of the total personality structure. There is probably at least one level above what is called the type level here. Some correlation between alpha and beta is suggested by the fact that they share one indicator, primary trait I. There might be still other primary traits also shared by alpha and beta, not represented in the picture.
>
> The consequence of all this is that factors reported in the literature may be at different levels in the hierarchy. Eysenck, who has concentrated his analyses on such broad traits as neuroticism, psychoticism and introversion-extraversion, arrives at factors that are even above the alpha and beta level. Cattell, who has used experimental variables at different levels in his analyses, has arrived at factors at various levels, though they probably tend to be at the level of types alpha and beta. One danger of confusion arises from the use in the same analysis of experimental variables from different levels in the hierarchy, which makes the results difficult to interpret. (Guilford, 1959).

Guilford concludes his book with a chapter concerning <u>dimensions of pathology</u>, the summary of which is worth reporting:

Experience in diagnosing patients in the traditional nosological categories shows a rather unsatisfactory state of affairs. Discriminations between normal individuals and pathological individuals reflect great variations in standards of normality and pathology. Classification of patients in different categories of pathology shows considerable disagreement among diagnosticians, except for the use of the grossest distinctions. Such a state of affairs calls for more rigorous methods of re-examining the traditional categories of pathology. The natural approach is through the study of concomitance of symptoms, which means intercorrelational studies of symptoms. Factor analysis has indicated many verified dimensions of both neurosis and psychosis, at different levels of complexity.

At higher levels of complexity the traditional neurotic disorders of neurasthenia, compulsion neurosis and conversion hysteria have been supported. Other dimensions of neurosis have been indicated at lower levels of complexity, including neurotic inadequacy, neurotic emotionality, neurotic anxiety, neurotic hostility, and neurotic sexual conflict, plus a pair of psychosomatic disorders of cardiovascular reaction and gastrointestinal reaction. The usefulness and significance of a proposed over-all neurotic-tendency dimension are still to be determined.

Among the less complex psychotic variables we have three involving cognitive symptoms primarily -- disorientation, hyperprojection, and paranoid disposition. We find four variables involving primarily emotional symptoms -- hyperexcitability, psychotic depression, psychotic anxiety and hyperirritability. A primarily psychomotor disorder is catatonia. Some of these dimensions exhibit pictures somewhat

parallel to corresponding dimensions of neurosis.

> Psychotic dimensions of somewhat broader scope include schizophrenic dissociation and deterioration. Still more complex syndromes correspond fairly well with traditional categories of pathology -- paranoid schizophrenia, hebephrenic schizophrenia and catatonic schizophrenia -- all of which combine the syndrome of schizophrenia dissociation with other syndromes of like complexity. Also recognized at the higher level of complexity are mania and bipolar variable called introjection vs. projection.
>
> The hypothesis of an over-all psychotic disposition which extends into the normal population, like that for a general neuroticism, still needs to be examined. The point of view of this volume has been against the idea of extending pathological variables into the normal population. Instead, it proposes the extension of descriptive variables (involvements of some of the patterns of primary traits in some of the syndromes of pathology have been pointed out) of the normal population into pathological groups, thus accounting to a large extent for their syndromes. (Guilford, 1959).

9. Frustration Theory and Estimation.

Reactions in difficult situations, or "frustration theory", is undergoing much criticism and inducing considerable research. Maier (1956) mentions some of the recent extensions of frustration theory:

> Using stressful and frustrating situations, Jost, Ruilman, Hill & Gulo (1952) were able to differentiate between the autonomic reactions of hypertensive patients and a normal control group. Jurko, Jost & Hill (1952) also obtained

> Significant differences in physiological measures between non-patient, psychoneurotic and early paranoid schizophrenic groups. The authors present evidence favoring differences in patterns of discharge between the groups, and suggest the concept of levels of energy discharge. Psychoneurotics tend to show hyperadaptation, whereas schizophrenics show dis-adaptation. They used the Rosenzweig Picture Frustration Test to produce the emotional changes. These studies are suggestive in that they reveal that persons suffering from emotional problems show physiologically different reactions to frustration than normals. In an earlier study, Sherman & Jost (1943) had found physiological measures to be sufficiently unique to serve a diagnostic purpose. Jost (1953), as well as Solomon & Wynne (1954), stresses the notion that the autonomic functions may influence higher neural centers by some feedback mechanism. This type of control over higher centers would seem to be consistent with frustration theory, and studies along this line should lead to further development and refinement of the theory.

Sargent (1948) has criticized Rosenzweig's use of frustration, but also praises him:

> More than any other interpreter of frustration, Rosenzweig stresses the importance of both emotional and "apperceptive" or judgmental factors. I feel, however, that he has made the latter too conscious. According to my hypothesis there is a continuously operating, relatively unconscious perceptual process which may be called "defining the situation."

Following Sargent's lead, the "difficult situation" is stressed, giving a broader scope to the theory proposed than that for "frustration" as such. In place of the "perceptual" process which may be called "defining the situation," the cognitive process called "estimation" or appraisal is alleged, as was mentioned on the first page. While such a process was mentioned by Aristotle and developed by Avicenna and Aquinas, Arnold (1960) has been the foremost propon-

ent of its function and importance. Thus, if the hypothesis of these three major personality tendencies is confirmed, the obvious question to follow should be, "Why do they react this way?", and the estimative process would be brought into the explanation.

10. Summary

The notion of tripartite division becomes prominent in the comparative study of "abnormal psychology" theorists and experimenters. Rosenzweig's suggestion of conscious types in the reaction to frustration depends upon his wide range of experience and his careful development of theory. His is a phenomenological approach. The study of reaction types through characteristic emotional response is sensible, but what is noteworthy is his emphasis upon the apperceptive type. That is, the appetetive or emotional is seen as based upon the person's cognitive structuring of the situation. It would appear that his tripartition has included the major and necessary distinctions, and has also exhausted the possibilities. Thus, his "armchair" theory becomes the more specific explanatory set which is to be verified in this dissertation.

CHAPTER II

REVIEW OF THE LITERATURE: THE TEST BATTERY

A. THE TAT STORY SEQUENCE ANALYSIS

Murray's (1943) Thematic Apperception Test shares, with the Rorschach, the status of being the first of the projective tests. This test has been used more widely than other story construction techniques and has served as a model for the development of others.

The materials for the TAT consist of nineteen cards with vague, black and white pictures and one blank. Murray and the Harvard Psychological Clinic staff suggest that the subject be instructed to make up a story to fit each picture, telling what led to the event, describing what happens at the moment (what the characters are thinking and feeling), and giving the outcome. With the blank card, the subject is to imagine some event and fit a story to it.

> In interpreting TAT stories, the examiner first determines who is the "hero," the character of either sex with whom the subject has presumably identified himself. The content of the stories is then analyzed principally in reference to Murray's list of "needs" and "press." (Anastasi, 1961)

A modified TAT technique is that of the "Story Sequence-Analysis." The subject is instructed to write a plot and outcome for each card. The stories, kept in proper sequence, are scored, not interpreted. The analysis underlying the scoring system does not depend directly on "needs and press."

1. RECENT RESEARCH WITH STORY SEQUENCE ANALYSIS

Since the Sequential Analysis for the TAT is of recent devising in the specific form treated here, and since it departs radically from interpretative and thematic methods, the most important literature is that incorporated in recent dissertations at Loyola University, by Burkard (1958), McCandlish (1958), Petrauskas (1958), Garvin (1960), Quinn (1961), Steggert (1961), Vasiliou (1962) and Williams (1963). Another source is Snyder's article in The Human Person (Arnold and Gasson, eds., 1954), "A research method validating self-determination." In an earlier book, Arnold (1960) outlined the method of sequential analysis for the TAT, with its research possibilities. More recently (1962) she has shown its application with a sampling of seminarians. And most recently (1962) her book with a complete rundown of the scoring technique has appeared, to which the reader is

referred. The technique has been built through empirical methods and through theory enlarged as a result of phenomenological analysis.

2. ATTITUDE SCORING.

In her discussion of research regarding the brain and psychological function (1960) she says:

> In the TAT sequential analysis, each story is summed up in the import, i. e., what the storyteller is saying about his life situation. This is a simple condensation of the moral of the story, without any interpretation. Each import, as indicated by story and outcome, may be either constructive or not constructive. It is constructive when the story import indicates that achievement is the result of effort, initiative, virtue or the outcome of a definite plan that accepts limitation and adapts to circumstances; when loss, harm or danger is overcome by positive action; when ill-intentioned action is punished, rejected or renounced; when others are met with good will, good fellowship or humor.
>
> The emotions that occur in the story seem to have been conquered when negative (e.g. fear, anger, resentment, discouragement) and fostered when positive (e.g. love, humor, cheerfulness). It is a reasonable assumption that stories which express such constructive attitudes are told by people who really have such attitudes. It would follow that they have developed habits of self-discipline which make it possible for them to achieve. . .
>
> The sequence analysis gives us a picture of a man's motivational pattern, his self-ideal in action. Thus it can be used to predict

whether he will act constructively or not. The sequence analysis will also show areas of conflict where firm convictions have not yet been formed. The normal person will reveal in the sequence analysis how he is ordering his life, not merely what are the raw materials that are so ordered. In the neurotic, the sequence analysis shows the preoccupation with particular areas of conflict, and in the psychotic, the difficulty, even the impossibility of acting effectively. It is a moot point whether a 'deeper' analysis will improve prediction. What does it profit us to know the emotions that harass a man if we are unable to tell whether he is their plaything or their master?

The best kind of test for evaluating human motivation seems to be a storytelling test, whether it is the TAT, MAPS, BLACKY, or a similar test. In telling a story, the individual is forced to fit emotion into action, and to do it in a way that agrees with his attitudes and convictions. To fragment the story by counting themes or rating the intensity of various emotions is to throw away the only chance we have of gaining a working knowledge of a man's principles of action. Such procedure would be comparable to scoring the number of times a child says the word 'ball' in Binet's ball and field test and disregarding the path he maps out for finding the ball in the field.

We have indicated earlier in the Appendix how the TAT stories can be scored so as to preserve the motivational pattern that reveals the principles a man lives by. If personality, in Gasson's definition, is "the patterned totality of human powers, activities and habits, uniquely organized by the person

> in the active pursuit of his self-ideal" (1954), it is revealed not only in behavior generally, but in the TAT in particular. The scoring system that can measure this pattern is still being developed. We are but at the beginning of a research program in this area which we hope will prove of interest to many others. Perhaps combined effort will finally yield a measure of personality and its motivation that is similarly useful, even though similarly restricted, as are our present tests of intelligence. (Arnold, 1960)

3. THE FOUR CATEGORIES OF SCORING

The scoring system for the TAT promised in the above has been developed (1962b) according to the hypotheses, and series of abstracted imports from categorized populations have been laid out in definite order from the highly constructive (+2) to the very non-constructive (-2) or negative, under the four major divisions of Achievement, Right and Wrong, Human Relationships, and Reaction to Adversity. Scoring amounts to a process of matching imports from your subject's TAT with the imports of the categorized scoring manual, and recording the "value" and the scoring legend. Vasiliou (1962) has developed specialized scoring for Sc (Schizoid) and Pd (Psychopathic) dimensions as well, in a rather tentative development.

This would leave another dimension, the Int. (Internalizing), or some such trait, open to development. While it is not the purpose of this dissertation to so construct the scale, it is foreseen that such a scale may come about by means of this research.

4. HYPOTHESIS TESTING

Hypothesis testing and prediction by means of the TAT scores have been tried recently. Prediction of success has been rather accurate, and most accurate of all is the separation of poorly motivated out of large pools of seemingly able and ability-equated persons. Arnold (1962a) reports:

> For students, the obvious criterion with which to compare TAT scores is the grades they obtain in school or college. Garvin (1960) gave the TAT (13 cards) to 45 girls, seniors at a Catholic women's college, and to 46 men, seniors at a Catholic men's college in Chicago. Their grade-point average at the end of senior year was used as a measure of their achievement in college. In this study Garvin used two positive and two negative scores as described earlier (+2, +1, -1, -2). Since the total range of student achievement was used, it was imperative to distinguish between TAT imports that were barely positive (or negative) and those that were strongly so.
>
> To compare the relation between grade-point average and TAT scores and between grade-point average and intelligence (as reflected

in ACE test scores), Garvin computed product-mement correlation coefficients between these three factors. He found a correlation of -.85 for the male students and of -.83 for the female students between grade-point average and TAT scores. This is a considerably higher coefficient than that between grade-point average and intelligence test scores (-.62 for men, -.45 for women). Apparently the stronger the motivation, the less need for high intelligence provided the student is intelligent enough to do college-level work. Not only the ACE test but the TAT Sequence Analysis also taps the degree of intelligence; this is shown by the correlation of -.58 (men) and -.47 (women) between TAT scores and ACE intelligence test. The multiple correlation of grade-point average, TAT scores and ACE scores does not materially raise the coefficient (-.86 men, -.84 women), when compared to the original correlation between grade-point average and TAT scores (-.85 men, -.83 women).

With a correlation of this size it should be possible to use the TAT Sequence Analysis for the selection of scholarship students or, in general, for admission to college and graduate school. The tests used at present (for example, the Miller Analogies Test, the Graduate Record Examination) are reasoning tests or achievement tests. Though achievement tests do include the motivation necessary for achievement, the student's motivation may have changed since he acquired the knowledge in the area tested. When these tests are supplemented by a test that primarily tests motivation, we would isolate the most important non-intellectual factor of college success, as shown by the above high correlations. (Arnold, 1962a)

5. BURKARD'S PREDICTION WITH TAT

Burkard (1958) used the TAT Story Sequence Analysis to predict teaching ability, employing the Diagnostic Teacher Rating Scale, Form A, as criterion.

> In this study no attempt was made to correlate TAT scores and pupils' ratings for the whole group of 300 teachers because it seemed more important to isolate the motivational pattern of the most highly rated teachers and compare it with that of teachers with extremely low ratings. The TAT scores ranged from +4 to +12 for the high-rated teachers and from -4 to -12 for the low-rated teachers. Thus, it seems clear that the TAT Sequence Analysis can select the teachers most effective in class and those least effective, and can do so without any overlapping, provided the scorers are well trained. (Arnold, 1962a).

6. CREATIVE IMAGINATION IN THE TAT, UNIQUE IN THE BATTERY.

For a most complete description of the TAT Sequence Analysis the book containing the scoring system and appearing in late 1962 by Arnold may be consulted. Because the creative process in story-telling is so "personal" by necessity, the test has promise when used in a battery with a checklist test and a physiologically-measured association test.

7. OTHER SCALES OF THE TAT

The TAT has been scaled in an Sc and Pd scoring system based on the Sequence Analysis by Vasiliou (1962),

so raw scores can be assigned for all subjects under this partially developed set of scales. Another scale may be sometime attempted, called the Int. scale, to get at the severely self-blaming, internalizing story-teller. These scales of the TAT have been built on an assignment of -2 score, one score to each story. A difficulty encountered in such a system is that a scorer finds some stories which are not "way out," so receive a -2 rating, and seemingly cannot be assessed for Sc or Pd.

B. THE MMPI

The MMPI is one of the most widely accepted paper and pencil tests of personality in use today. Anastasi (1954) calls it "a major event in the recent history of personality testing."

1. 9 CLINICAL SCALES, S_1, AND VALIDATING SCALES

The Minnesota Multiphasic Personality Inventory (MMPI) is designed to provide an objective assessment of some of the major personality characteristics that affect personal and social adjustment. The carefully constructed and cross-validated scales provide a means for measuring the personality status of literate adolescents and adults together with a basis for evaluating the acceptability and dependability of each test record. Nine scales were originally developed for clinical use of the test and were named for the abnormal conditions on which their construction was based. Since they have been shown to have meaning within the normal range of behavior, these scales have now come to be referred to by their abbreviations--Hs (hypochondriasis), D (depression), Hy (hysteria), Pd (psychopathic deviate), Mf (masculinity-femininity), Pa (paranoia), Pt (psychasthenia), Sc (schizophrenia),

and Ma (hypomania) -- or by their code numbers (1-9) to avoid possibly misleading connotations. A large number of other scales have subsequently been developed from the same test items; Si (social introversion) is one that is commonly scored. There are also three validating scales: L (lie), F (validity) and K (correction).

2. MMPI EVEN TO NINTH GRADE STUDENTS

Care must be exercised to maintain the appropriate test conditions. So long as the test is introduced as neither a threat nor a diversion, even adolescents, sophisticated military personnel, and hardened criminals can be expected to respond well to the group administration of the MMPI. The experience of Hathaway and Monachesi (1957) shows that large groups of ninth-grade children, sometimes several hundred at a time, can be given the MMPI without a single significant difficulty. They attribute a great deal of their success in testing thousands of children to careful preparatory work with responsible teachers and other school officials and to the professional and competent bearing of the examiners.

3. HIGH SCORES, FOR ABNORMALITY

The source of most of the evidence for the validity of the MMPI has been its agreement with final clinical

diagnosis of new psychiatric admissions. The agreement has been in terms of various kinds of clinic cases, which is a result more difficult to achieve that simple classification as to normal or abnormal. Even where a high score on the MMPI was not followed by a corresponding diagnosis, there was evidence that the trait was present to an abnormal degree.

4. RELIABILITIES

The authors of the Manual of the MMPI (1951) report reliabilities, for both normal and abnormal adults which range from the fifties to the low nineties. But a study of the split half reliabilities of college students reports lower coefficients. The following are the coefficients listed: Hs, .78; D, .58; Hy, .47; Pd, .46; Mf, .73; Pa, -.05; Pt, .81; Sc, .79; Ma, .55.

5. SPECIFIC CLINICAL SYNDROMES NOT WELL TESTED BY MMPI

This casts doubt upon the present suitability of the individual categories of the MMPI for differential diagnosis. Wheeler, Little and Lehner (1951), summarizing the results of a factor analysis of the MMPI categories, report that the goal of using the MMPI for measuring specific clinical syndromes has not been achieved.

6. ANXIETY INDEX OF WELSH

One distinct factor, according to these authors,

was the so-called "neurotic triad" (hypochondriasis, depression and hysteria). Clinically, many workers use these three scales in combination for better diagnosis. Ruesch (1945) has used the mean of the neurotic triad as a neurotic score, in an attempt to derive a more objective measure. Welsh (1952), in a study on anxiety diagnosis, found that anxiety neurotics were high in the neurotic triad, with a peak on the D scale, and a secondary peak on the Pt scale. Therefore, in order to take this into account and better diagnose different degrees of severity of anxiety, he developed an anxiety index:

$$AI = \frac{Hs - D - Hy}{3} (D - Pt) - (Hs - Hy)$$

or

$$AI = 1.33\ D - Pt - .66\ Hs - .66\ Hy$$

7. A SINGLE PERUASIVE CHARACTERISTIC OF PERSONALITY?

The Herr-Kobler Test with its Ratio score most probably measures something basic in personality. Woodworth is one of many authorities who hold this view about the aptness of PGR. The task would be to find an index for the MMPI similarly measuring something basic in personality, and this across a continuous range in various

persons. The suthors of The MMPI Handbook (1960) allude to the many attempts to get at "a single, pervasive characteristic of personality" through various scales applied to the MMPI. The "Assessment of Emotional Control" forming the 10th chapter of the Handbook, under Part III, Clinical Spplications, presents this introduction:

> The concept of a single, pervasive characteristic of personality that furnishes strength in the face of temptation, stability under external and internal stressors, or control over conflicting impulses to action has long been used by personality theorists to account for the vast differences that are found in individual tolerance and integration. Whether it is called will power, character, general normality, ego strength, self-consistency, radix, biosphere, regnancy, or self-actualization, the view that a person's stability over time and across situations stems from a single organizing process keeps reappearing in psychological theories. Several of these constructs have been used, together with their nomological networks, in deriving MMPI indices of integration and control. (Dahlstrom and Welsh, 1960)

8. BARRON'S "EGO STRENGTH" - A SINGLE SCALE

The Handbook authors discuss a series of scales which attempt to make some measure of a single organizing process. Of these, "One other scale, Barron's (1953) ego strength (Es) has been developed empirically for this general problem. Barron's criterion was response to treatment; his item analysis identified the pretreatment attributes that bore some relationship to the degree of

improvement the subjects showed after individual psychotherapy. These items were assumed to be indicative of difference in strength of ego structure." Summing up the "single dimensional approaches", they say: "Since scores on the A scale (Welsh, 1956) are closely related to ES score values, perhaps the combination of A and R (Welsh, 1956) would give all the information provided by the Es scores. This remains to be tested by direct empirical study, however, based on detailed personality descriptions. At present, the best single index of control within the MMPI seems to be the Es scale."
(Dahlstrom and Welsh, 1960).

9. WELSH'S INTERNALIZATION RATIO - CONFIGURAL ANALYSIS

The subject next taken up in the Handbook is that of "Configural Approaches," and first mentioned is Welsh's internalization ratio, IR (Welsh, 1952). He wanted to evaluate "tendencies on the one hand to internalize difficulties and to suffer distress, somatic symptoms, and self-excoriation, and on the other hand to externalize problems by acting out, projecting and disowning. His index gives a theoretical value of 1.00 for normals, with lower values indicative of poor control and direct, overt expression of emotional difficulties."
(Dahlstrom and Welsh, 1960).

The Handbook comes to this conclusion in the general section:

> As the findings of future research accumulate, it will probably become apparent that different impulses are controlled by separate personality processes, rather than by any single, pervasive self-structure. The material reviewed in the next several sections has been brought together to show evidence available on such a formulation of control (judgment, control of hostility, control of sexuality, suicide, addiction, control of delinquency, and criminality.) In addition, the basis within the MMPI for judging the specific way that loss of emotional control may be shown by a particular patient will be described. Even though the controling process may be seen as unitary and multifaceted, a breakdown in its effectiveness would not necessarily lead to poor control in all areas of emotional expression. Rather, the first break in self-maintenance may be related to the relative strength of impulse in the different emotional areas. The material in the following sections should be pertinent to either general formulation of personality." (Dahlstrom and Welsh, 1960).

10. RESEARCH THROUGH WELSH'S FACTOR SCALES A and R

The evaluation of the IR by the Handbook at this point is surprisingly nonchalant, but for many reasons its use in research takes on importance. For instance, many years ago Cattell (1936) made this hypothesis: "The deflection (in PGR) is proportional to the act of suppression which the ego finds it necessary to exercise upon the impulse aroused. The psychogalvanometer can therefore be used as a measure of the strength of impulses,

of will acts, and of the conflict between them."

The Handbook in turn says of repression:

> A better approach to this problem of sensitization and repression would seem to be either through the use of Welsh's A and R factor scales, or through the Ad and Dn subscales on scales 3. Truax (1957) in a footnote to his study of Hy-Pt observed that Ad contributed 53 per cent of the Hy score for the sensitizers but only 6 per cent of the Hy score for the repressors. Van de Castle (1958) has shown that a conjoint use of A and R scales gave dependable separations consistent with the sensitization-repression formulation of perception of aggressive verbal material. For his sensitizer group he picked subjects with high A and low R scores; the repressors came from the diagonal quadrant, high R and low A values.
> . . . An attempt was made by Obrist (1958b) to demonstrate a relationship between sensitization-repression, as reflected in a composite scale formed by scales 3, 7, K, and Welsh's A and R, and subception, or autonomic discrimination without awareness. His research design involved excellent procedural controls and he found that he was unable to detect any subception effect. As in a previous study by Obrist (1958a), no relationship between psychogalvanic conditioning and sensitization could be demonstrated either.
>
> Apfelbaum and Sherriffs (1954) found that subjects high on Welsh's A scale tended to rate the experiences they recalled under various experimental conditionings as significantly more unpleasant than low scorers. On the other hand, subjects who had an IR index in the externalization direction recalled appreciably more pleasant experiences, expecially when instructed to describe the mood at the time of the experience rather than merely how they felt about the recalled material now. In a different experimental procedure in which the success or failure of the subject was explicitly known, Christine Miller (1954) found that some MMPI variables were related to the tendencies

to recall predominantly successful or unsuccessful instances. In a group comparison, a high score on scale 9 was related to the tendency of the subjects to recall the items on which they had scored successes. The externalizers on IR also more generally recalled the successes while the internalizers gave significantly more failure recollections.

11. AI and IR SCORES IN COLLEGE STUDENTS

Renzaglia (1952) noticed persons with lower self-evaluations than the general self-description that was typical for college students had more aberrant Welsh AI and IR values. This relationship to AI and IR was also found for those who had the largest discrepancies between self-description and self-denial characterization.

12. DEPENDENCY RELATED TO AI and IR

In other research, Warn (1958) found tuberculous and epileptic groups score higher on dependency than the paraplegics and controls; the latter groups could not be significantly separated. He also found a relationship between the development of dependency patterns and elevated anxiety values and internalized defenses. Pumroy and Kogan (1958) attempted to evaluate the accuracy of the Ps scale, as well as Welsh's AI and IR indices and Pearson's signs, in predicting the response of male V.A. cases to EST. (Dahlstrom and Welsh, 1960).

13. IR and PGR RESEARCH

Finally, experimentation summarized under "Analysis of symptom formation: psychosomatic relationships" in the Handbook mentions Welsh's IR and some connection with PGR:

> In the face of the severe limitations on the experimental approaches to these problems, many workers have resorted to correlational studies in which not all the variations are produced deliberately but some are merely noted in the group and collated with other measures. Thus Brower (1947b, 1948) has combined correlational and experimental manipulations in his study of cardiovascular changes. Factor-analytic exploration of the intercorrelations between various MMPI measures, experimentally produced indices of stress, and rating scale data was carried out by Holtzman and Bitterman (1956). Lewinsohn (1956b) used patients from several psychosomatic groups as subjects in a study of personality variables, stress conditions, and physiological changes in steadiness, psychogalvanic response (PGR), salivation, and cardiac measures. The PGR was also employed by Cofer, Judson, and Weick (1949) and by Calvin and Hanley (1957) as a measure of reactivity to the content of MMPI items. Ruesch (1945a, 1945b) studied the relationship of MMPI variables to such physiological features as ventilation rate or production of lactic acid during work. Greenberg and Gilliland (1952) correlated indices of basal metabolic rate and the basic MMPI variables. Janda (1951) used Welsh's AI and IR indices in a battery of measures to investigate personality processes in accuracy of night vision. (Dahlstrom and Welsh, 1960).

14. IR RANGE: INTERNALIZING TO PSYCHOPATHY

One of the advantages brought by the Internalization Ratio of Welsh is its employment of the major portion of the MMPI profile. It omits scales 6 and 8, but the other six scales along with the K correction factor enter into the index. Thus, the range is that from the psychopathic personality of grave character disorder at one end to the psychoneurotic at the other, with the more normal in the mid ranges. The third dimension, of the more psychotic, is left for the other indices; there are some theorists who hold these to be mental cases of organic defect, so it may be well to have left the psychotic out of the continuum of personality types.

15. 68'S OR 86'S IN THE MMPI HANDBOOK

The 68's or 86's omitted by the IR are spoken of in the Handbook in these words:

> Guthrie described the group of medical patients with this profile pattern as prepsychotic with schizoid personality patterns. They were, however, making a marginal adjustment without hospitalization; physical complaints and preoccupation with health may have served to stabilize their precarious adjustment. They presented a wide variety of complaints which shifted from visit to visit. They also had many food fads and depended upon patent treatments and medicines. Their relationships with others were unstable and characterized by resentment.

In the psychiatric population that they studied,

> Hathaway and Meehl (1951b) found the "68" group largely composed of psychotics, the majority being frankly schizophrenic, with a smaller portion in paranoid states. The most common feature of the behavior of these patients was the presence of paranoid delusions, but many of them also showed depression, apathy, irritability and social withdrawal. Although they had conduct or behavior problems, their difficulties were not the classic scrapes of the amoral, asocial psychopathic group. (Dahlstrom and Welsh, 1960).

16. CHECKLIST ADJECTIVE STUDIES

The studies of Black (1953), Gough (1946) and Hovey (1953) should be pointed out as having basic import in this personality analysis, for through checklists and testing of college groups, they have brought the MMPI to bear upon the problems of personality at large, rather than that it be left simply a tool for psychopathic diagnosis.

The configural analysis, or rather synthesis, which the Internalization Ratio of Welsh affords, then, appears to be of use in evaluating the MMPI; through the relationship of Welsh's Ratio to Cleckley's overall view of personality types and with the concept that there is both configuration in the profile and a hierachy in human powers, the MMPI through this measure should provide an insight into emotional eccentricity or balance within the personality. Joined with TAT and PGR Tests, it

should help form a rather adequate battery.

17. OTHER SCALES FOR THE MMPI

The MMPI was criticised earlier for presenting no single scale to be applied here. However, there are many scales which work at special areas in the "profile". In addition to the IR of Welsh, there is his AI, which is derived from the T scores of the profile in the formula: AI = 1.33 D - Pt - .66 Hs -.66 Hy. The FaPaSc scale was constructed, to pick up some of the score of the MMPI purposely omitted in the IR. It is the average elevation of three scaled scores above fifty (the norm), i.e., the sum of the Fake, Pa (6) and Sc (8) in their height above fifty (in T scores) divided by three. Another scale available is the CI or Critical Items of Grayson. It is made up of the raw score for Faking plus 38 other items selected from the possible 566.

Again, there is the Sarx ratio, estimated from the Fm, K, and FhR scales. The Fm scale of Hecht has 38 items, and appears as #68 in the Handbook of the MMPI. A raw score cutting point of 15 is used in the Sarx ratio. The K scale is that of the profile, and the cutting point is 50, on the T score system. The FhR score is derived by calculating the distance in T scores between the Ma (9)

scale score and the Si (10) scale score. When the 9 score is greater than the 10 score, the difference is subtracted from 1.00, and whn lesser, it is added. To this FhR score is added any Fm score above 15 and any K score below 50 (by its distance from 50); or, from this FhR score is subtracted any Fm score below 15 and any K score above 50. The total, converted to a scoring with 100 as its mean, yields the Sarx ratio measure. In addition to these, and useful in another separate analysis, are the scales arrived at through factor analysis by Welsh, namely, his A, R, C and P factor scales, for factors 1, 2, 3 and 4. Also, the simple Fm scale of Hecht is worth trying as it stands, and the Es (ego strength) scale of Barron may be useful.

C. THE HERR-KOBLER PGR TEST

(Note: Treated at length because:
(1) no book on the subject
(2) apparatus and detailed procedure necessary)

1. PGR AND "EMOTION."

The psychogalvanometer and psychogalvanic response have engaged the interest of nearly all experimental psychologists. A listing of the experiments and devised tests in the following paragraphs show how widespread and consuming this interest has been. Some authors in summarizing experimentation with the PGR speak of much time wasted as, for example, Woodworth and Schlosberg (1954) and Arnold (1960); yet their major criticism seems to point more to the confusion in the experimenters' thinking about what emotion is than to any basic flaw in the PGR itself.

Woodworth and Schlosberg (1954) treat of the apparatus, techniques, stimuli and response at length in their Subject Index.

2. APPARATUS AND TECHNIQUE

Fére, the first to publish an article about the PGR (1888), passed a weak current through electrodes

on the forearm. He had a galvanometer included in the circuit. His subjects were presented with stimuli such as the sound of a tuning fork, the sight of colored glass, or something to smell. The quick deflection of the galvanometer indicated an increased flow of electrical current resulting from a decrease in bodily resistance. Two years later Tarchanoff (1890) reported on a difference in electrical potential for any two areas of the skin which may be connected through a galvanometer. A weak current was found passing through the galvanometer in a certain direction. He neutralized this current with a weak external current opposed to it so that the galvanometer was balanced. Then, a stimulus applied to the subject would yield a deflection of the galvanometer with a two or three second latency. Not only sensory stimuli but shifts in mental activity, he found, brought about this response.

Though the names, Féré effect and Tarchanoff effect, would seem to indicate two distinct phenomena, it is generally agreed that the two men found slightly different ways of measurement. Woodworth (1938) says that though the effects differ physically, they are

indicators of the same physiological activity. Tarchanoff's method has been carried out by Forbes & Bolles (1936), and Hovland & Riesen (1940) and recently by Wilcott, Darrow & Seigel (1957). The Féré method has been preferred in research. (Strohl, 1921; James and Thouless, 1926; Hozawa (1928); Gildemeister, 1928). When the bodily resistance has been temporarily reduced the Fere method yields an increased flow of impressed current. (Davis, 1934; Montague, 1958.) Polarization is alleged generally as the cause of the body's normal resistance. An ordinary theory predicts greater polarization with greater impressed voltage. The "Fere effect" would consist then, in a partial or temporary depolarization of the cell walls (especially of the sweat glands) through which the current is passing. The galvanometer picks up this temporary change as a temporary decrease in bodily resistance (Veraguth, 1909; Jeffress, 1928.)

Of the three theories proposed in explanation of the electrical phenomenon, the "secretory" theory with its emphasis on the presecretory electrical activities of the sweat glands (McCleary, 1950) and phenomenon of depolarization, appears to have greater

confirmation than the muscular theory or the vascular theory. Both Richter (1926) and Darrow (1937) agreed with d'Arsonval (1888), a collaborator of Fére, that the PGR in the action current of Tarchanoff and depolarization of Fére was a result of sweat gland activity. Richter, Woodruff and Eaton (1943) confirmed this, as did Goadby & Goadby (1949).

The effect has been treated through the years in experiments of Darrow (1929); Dysinger (1931); Misbach (1932); Darrow (1932); Syz & Kinder (1928); Richter & Woodruff (1942); Silverman & Powell (1944); Wenger & Gilchrist (1948); Wang (1957); and Shackel (1959). Williams (1960) discusses the effect fully, to whose thesis the reader is referred.

"The Nature and Causation of the Galvanic Phenomena" is the title of an article by Sidio & Nelson (1910), and this subject is pursued by such authors as Uhlenbruck (1924); Richter (1929); Thouless (1929 & 1930); Langworthy & Richter (1930); McDowall (1933); Darrow (1937); and McCurdy (1950).

The neurology of skin conductance is sketched by Woodworth & Schlosberg (1954) where, in their short treatment, they say, "Insofar as this system tends to

discharge as a unit, the skin conductance at any point is a measure of sympathetic activity. As we have already noted, the sympathetic system is basic to emotion, or more specifically, to activation. Thus the skin conductance is a valuable measure of activation." Arnold (1960) mentions the sympathetic and the parasympathetic excitation of the sweat glands and gives the reasons why the PGR is not as useful as was once hoped in the measure of specific emotions. "The autonomic changes that occur in emotion are anything but simple."

The phenomenon was called the psychogalvanic reflex by Veraguth in 1906. The term "R" in PGR is often taken as "responses" rather than "reflex," and in this meaning PGR is perhaps the most used among the other alternatives "galvanic skin response" (GSR) as used by Woodworth (1954) and "electrodermal response" (EDR) used in the Psychological Abstracts since 1959.

3. CHOICE OF INSTRUMENT

To cover the many and various fields of literature reported it may be well to pick out the discussions of apparatus used in the PGR. The Loyola University psychogalvanometer has been constructed in

view of the many instruments built to so measure this effect. Richter (1927, 1929) discusses the Tarchanoff effect and the circuits and electrodes used for this measure. Jeffress (1928) speaks of the reflex latency of between one to three seconds and has a method of simultaneously photographing the galvanometer deflections. Darrow (1930); Davis & Porter (1930); Seward & Seward (1934); Forbes & Landis (1935); and Forbes (1936) all discuss circuits and electrodes and this material is summarized in Woodworth (1938). Haggard & Gerbrands (1947); Lacey & Seigel (1947, 1948), discuss the circuit used in measuring PGR. Armington (1949) speaks of a machine costing $17.00 useful in class demonstration and student employment. Silkett & Driscoll (1949); Trueblood & Grings (1950); Whelan (1950); Flanders (1953); Stewart (1954); Nichols & Daroge (1955); Steingart (1955); Traxel (1957); Shackel (1957); Levy, Thaler & Ruff (1958); and Lester (1958) all emphasize new techniques, new methods or new instruments for measuring PGR. Weisgerber's (1951) thesis discusses the Loyola U. psychogalvanometer in detail.

4. UNIT OF MEASURE

A. Level of Basic Resistance.

One of the major problems involved in the use of the PGR and the psychogalvanometer is the choice of an adequate unit of measure. This is necessary to make the results of different individuals comparable. It has been established that the magnitude of any individual PGR response is in part determined by the level of "basic resistance" of the subject at the time of the stimulation. The higher the basic resistance, the larger the momentary variations will be.

B. Darrow-Skewed Distributions and Log Conductance Scores.

Because of this, Darrow (1937a) has shown that if resistance scores are used, disregarding the level of basic resistance, the distribution of scores will be markedly skewed. Similarly, if conductance change scores are used, as suggested by Hovland & Reisen (1940), Freeman & Katzoff (1942) and Lacey (1947), a skewed distribution will also result, since the conductance is simply the reciprocal of resistance. But Darrow also found that a log conductance change

gives a much more normal distribution. Sherman & Jost (1942) stated their preference of the per cent change of resistance.

C. Haggard-Log Transformation.

Haggard (1945, 1946, 1949) after reviewing a number of different methods found a logarithmic transformation most useful. He showed (1945) that unconverted resistance or conductance scores are inadequate measures. The advantages of using Haggard's transformation are these: the simplicity of transformation, equal units, and a normal distribution. The Haggard score is computed by adding an empirically-determined constant to the log resistance-change score, and dividing the sum by the level of basal resistance. Since the resulting scores are in decimals, they can be multiplied by the constant for their removal.

Therefore the resulting formula, which is used in this study is:

$$SC = \frac{\text{Log resistance change} - K}{\text{level of basal resistance}} \times 10^{b}$$

d. Haggard's Transformation Widely Used.

Haggard's transformation has been widely but

not universally employed. Lacey & Siegel (1949) agreed that either conductance scores or log conductance scores were satisfactory units. More of this discussion of the appropriate unit may be found in Duffy & Lacey (1946); Haggard & Garner (1946); Lacey (1946); Lacey & Siegel (1947); Jones & Haggard (1948); Copelman (1951); Stevens (1951); Urano & Tago (1954); and Bitterman, Krauskopf & Holtzman (1954).

e. Paintal's Ratio of Resistance Changes.

Paintal (1951) suggested that the proper unit was the ratio of the resistance change to the maximum resistance change obtained for each subject, arguing that these ratios should be preferred to any transformation scores in which the individuality of the subject was lost. Elliott & Singer (1953) have supported Paintal's findings, but Niimi & Hashimoto (1953) have continued to use the percentage change of conductance, while Schlosberg & Stanley (1953) have preferred the square root of the conductance. Nichols & Daroge (1955) have suggested still another method of computing PGR scores, namely:

$$\text{Score} = \log \frac{100}{(\text{basic})\ (100-\text{PRE})} - \frac{100}{(\text{basic})\ (100-\text{Post})}\ 10^{-6}\ .10^{6}$$

Grant (1956) used analysis of variance tests but found that even these did not constitute a universally applicable method of analyzing and comparing trends in his PGR data. All in all, it is Haggard's transformation that is used most frequently in published research.

5. TEMPERATURE EFFECTS - WEISGERBER

The discussion of temperature effects is rather lengthy. To mention one, Kleitman & Ramsaroop (1948) discuss the periodicity in body temperature and heart rate. Weisgerber's (1951) thesis discusses the effects of temperature in measuring PGR. Sleeping and waking occupy much discussion. Farmer and Chambers (1925) say that the PGR is high during sleep and falls again when a person wakes. Richter (1926) makes a similar discussion, and Jones (1930) showed that it is the palmar and plantar areas which really manifest the effect during waking and sleeping. The log resistance, for instance, does not show this same measure. Landis & Forbes (1933) confirmed this same fact. Freeman & Darrow (1935) and Kleitman (1950) discuss this same subject and would indicate that the degree of attention that a person has and their physiological state would

make quite a bit of difference in the PGR manifested in any kind of testing procedure. An interesting experiment might be that of running several people together in the same circuit. Hansel (1951) did just this, hooking together many people in parallel and running the PGR of the group. Yamaguchi (1948) ran a dispersion on the pooled momentary reaction potential of a group. Changes become evident during the day, and Waller (1919) showed that resistance is high in the morning, low at midday, and high again late in the day. Wechsler (1925) confirmed these findings and also measured the resistance during an arithmetic test.

6. PGR IN RESEARCH, BEARING ON TESTING WITH THE H-K PGR.

We have already summarized what Woodworth & Arnold have had to say on the relationship of emotion and PGR. In addition, neurological research using PGR, along with other research measures, has found the psychogalvanometer to be a useful bridge from organ to function. Schoonhoven (1925) found that measures of blood pressure, pupil diameter and PGR were not consistent. A dissertation in a similar vein but employing color as stimulus was presented by Smith (1958). General treatments, for example, the "perception of autonomic activity" (Mandler,

Mandler & Uviller, 1958) have come from the research of Bard (1934), Liberson (1949), and Mundy-Castle and McKiever (1953), who report an alpha frequency of EEG corresponding to PGR adaptation rate; also Copelman (1957); Leucotomy (Ashby & Bassett, 1950); EEG and chlorpromazine (Turner, Berard, Turner & Franco, 1956); EEG and conditioned reflexes (Novikova & Sokolov, 1957, who report a relationship of alpha EEG rhythm to PGR); EEG pattern and ease of eliciting PGR (Charan & Goldstein, 1957); and finally, EEG, EMG and PGR (Sokolov & Mikhalevskaia, 1959), have been a few of the investigations.

The effect of hypnosis on the PGR of the person undergoing it has been studied by Sears (1932), Davis & Kantor (1935), who say the suggestion makes the difference; Marenina (1949), West, Niell & Hardy (1952) who found PGR to diminish and under deep hypnosis to disappear; and Sears and Beatty (1956).

Along with the reports of lessened PGR after repetition of stimuli are studies on the day after day habituation, on preparation and trials, and on adaptation. Examples of these are Farmer & Chambers (1925); Porter (1938); Conklin (1951); Fraisse & Jampolsky (1952);

Niimi & Hashimoto (1953); Bassett and Ashby (1954); Mundy-Castle & McKiever (1952); Novak, Moriarty, Koltuv & Welsh (1956); Grings & O'Donnell (1956); and Grings & Shmelev (1959). Cardu (1954) employed PGR clinically as a measure of emotional difficulty. He found PGR to grow best by repetition.

Drug effects and PGR have been studied rather thoroughly. The drug effect has been produced by tea (Stanley & Schlosberg, 1953); near or real beer (McDonnell & Carpenter, 1959); alcoholic beverages (Carpenter, 1957); wine, whiskey and alcohol (Greenberg & Carpenter, 1957); Atropin (Mall, 1936); chlorpromazine (Clerc, Turner & Berard, 1956); tranquilizing drugs (Mitchell, 1958); menthylpentynol (Bartholomew, Franks and Marley, 1958); L. S. D. 25 (Vinar, 1958); and electroconvulsive shock (Heistad, 1958). Cattell (1929) says that the deflections of the galvanometer are decreased through fatigue, depression, alcohol, morphine, chloroform, ether, and during menstruation.

Studies in alertness, expectancy, suggestion, instructions, set, and attention have been done by Darrow & Heath (1932); Switzer (1933); Bagchi & Greenwald (1937); Girdem (1952); Coppock (1955); Otani (1955);

Kehres (1956); and Stukat (1958). Subliminal perception has found its indicator through PGR in the research of McCleary & Lazarus (1949); Lazarus & McCleary (1951); Lowenfeld, Rubenfeld & Guthrie (1956); and Dixon (1958).

Conditioned response and PGR make a natural combination. Some of the articles dealing with research in this field are the following: Langfeld (1931); Hovland (1937); Cook and Harris (1937); Grant & Schneider (1947); Gladstone, Yamaguchi, Hull & Felsinger (1947); Hull, Felsinger, Gladstone and Yamaguchi (1947); Grant & Schneider (1949); Grant, Meyer and Hake (1950); Longenecker, Krauskopf & Bitterman (1952); Moeller (1952); White & Schlosberg (1952); Wickens, Schroder and Snide (1954); Bitterman, Reed & Kubala (1953); Grant and Schiller (1953); Meritser & Doerfler (1954); Moeller (1954); Bierbaum (1955); Gordon (1955); Terekhova (1958); Alexander (1958); Chaiklin (1958); and Doerfler & Kramer (1959). Coppock & Chamber (1959) have developed an interesting view: "GSR conditioning: an illustration of useless distinction between 'types' of conditioning." These experiments in conditioning, together with the use of the PGR in lie detection,

usually make up the core of discussion in the general psychology text books when they deal with PGR. Research in the above mentioned lie detection, outside of that mentioned in The Police Gazette, has been carried on by Rao (1956); Rouke and Kubis (1948); Block, Rouke, Salpeter, Tobach, Kubis and Welsh (1952); Guertin & Wilhelm (1954); Iwahara, Miseki, Shiokawa & Yoshida (1955); and Block (1957).

The question of voluntary control over PGR is of high theoretical interest. Some bit of the research is included in the work-summary of Cattell (1929). Other studies are those of Abramowski (1913); Hudgins (1933); and Noble (1950). "The hypothesis which seems to the present writer most apt to the facts is that the deflection is proportional to the act of suppression which the ego finds it necessary to exercise upon the impulse aroused. The psychogalvanometer can therefore be used as a measure of the strength of the impulses, of will acts, and of the conflict between them." (Cattell, 1936).

Muscular activity and physical effort induce changes in PGR. Measures of such changes have been made by Starch (1910); Claparede (1924); Seward & Seward

(1934); Essen and Hansen (1940); Ryan & Ranseen (1944); and Heinze (1955). "Environmental factors have greater importance than the hereditary ones," says Ohira (1956) in a study of twins. Children have come in for study by Jones (1930 & 1950) and Veinger (1950).

Redlich (1945) reported on a method of differential diagnosis of organic and hysterical anesthesia with the aid of the PGR. Other studies in organic defects and defectives have been done through the years by Vigouroux (1879); Prideaux (1921); Lacey, Steigel & Stuckey (1948); Lacey, Siegel and Siegel (1949); and Panel & Barclay (1959).

7. SO MUCH RESEARCH, BUT YET NO PGR TEST AS SUCH.

Various mental states have been tested through PGR studies: the neuroses, Shirokov (1937) and Venables (1955); the psychoses, Hoch, Kubis & Rouke (1944), Paintal (1951, 1952), Stewart, Winokur, Stern, Goze, Pfeiffer & Hornung (1959); mental deficiency and IQ level, O'Connor & Venables (1956), Irwin, Hind & Aronson (1957), Ellis & Sloan (1958), Pryer & Ellis (1959); various personality types, Marinesco, Copelman & Stanescu (1937), Champion (1950), Bitterman and Holtzman (1952), Efron (1954), Grant (1956), Ohira

(1958), Grant (1957).

Animal PGR for comparison and for neurological research has undergone the scrutiny of Wang & Richter (1928); Wange, Pan & Lu (1929); Wang & Lu (1930); Knauf (1954); Haggard and Thompson (1954); Wang, Stein & Brown (1956); Wang & Brown (1956 & 1957); and Shaklee (1957).

Auditory acuity and the study of deafness has found an important research tool in the PGR: Crombs (1938); Michels and Randt (1947); Dreher (1948); Doerfler (1948); Davis (1948); Knapp & Gold (1950); Littman (1949); Hovland (1949); Bordley & Hardy (1949); Doerfler & McClure (1954); Stewart (1954); Goldstein, Polito-Castro & Daniels (1955); Aronson (1957); Hind (1958); Buck (1958); Aronson, Hind & Irwin (1958); Hanely, Tiffaney & Frungard (1958); Rosenblat, Bilger and Goldstein (1959); Grings, Lowell & Rushford (1959). Two studies concerning preferences in music were done by Henkin (1957) and Traxel & Wrede (1959). Preferences in advertising, Eckstrand, Gordon & Gilliland (1948); Golin and Lyerly (1950).

8. EMOTIONS AND PGR.

Particular studies in emotion and PGR have been

very numerous. Some of these are listed below: frustration, Freeman (1940), Jost (1941), Sherman & Jost (1942), Thiesen and Meister (1949), Thetford (1952), Schwartz (1957), Flanagan & Herr (1959); instincts and sentiments, Shock and Coombs (1937), Turner (1954), Ader (1959); pleasant-unpleasant, Dysinger (1931), Reich (1950); fear and anxiety, Bayley (1928), Welsh & Kubis (1947), Welsh, Livingston & Kubis (1947), Coppock (1949), Schiff, Dugan, Livingston & Welsh (1949); Ax (1951), Berry & Martin (1957); anger, Funkenstein, King and Drolette (1953); speedy or difficult work, Sears (1933), Fraisse & Bloch (1957); mental work: abilities (insight), Prideaux (1920), Bartlett (1927), Patterson (1930), Carter (1950), Kuppers (1954); emotional involvement in problem solving (driving, flying), Hussman (1955), Hulbert (1957), Venables (1956); subjective effort (stress), Lanier (1941), Holtzman & Bitterman (1954), Baker & Taylor (1954); Raphelson (1957); attitude and strong attitude (racial or national bias), Wiener, Salpeter, Tobach, Wineburg & Welsh (1952), Cooper & Singer (1956), Cooper & Siegel (1956); failure-success, Procter (1953), Mizushima (1954); vision, Wagner (1950); predicament, Abel (1930); embarrassment, Dittes (1957);

mobilization-expectancy-actuation, Darrow (1936, 1937), Freeman (1940), Burdick & Burnes (1958), Oswald (1959), Merlin (1958); threat (defense, avoidance), McGinnies (1949, 1950), Novak, Hayes, Goodman & Welsh (1955), Sines (1957); startle-surprise, Patterson (1930), Steinberg (1949), Howes and Solomon (1950); anxiety producing stimuli, Taylor (1950), Silverman (1960); pain, Dennard (1950), Furer & Hardy (1950), Clausen, Gjesvik & Urdal (1953), Behr, Preber & Silverskiold (1955), Clausen, Urdal & Gjesvik (1955), Fujiki, Sadakata, Saito & Endo (1958); acting out, Barratt (1959); induced-tension, Staudt & Kubis (1948), Landis & Hunt (1935), Bloch (1952a & b), Kushner (1955).

Some excellent studies have been done in the nature of emotion through means of PGR research. Some of the most significant writers are these: Wells (1924); Thouless (1925); Aveling (1926); Syz (1926); Landis & DeWick (1929); Landis (1930); Duffy (1934); Masserman (1941); Arnold (1945 & 1950); Leeper (1948); Lindsley (1951). Arnold (1960) has this to say in her summary:

> "In addition, we have suggested on the basis of neurophysiological evidence that the PGR accompanies any impulse to action, voluntary or involuntary, deliberate or emotional. The

> reaction to sensory stimulation, as well as startle and various emotions, are all accompanied by psychogalvanic deflections. These will be largest when there is a sudden impulse to action (e.g., in startle).
>
> Since all action impulses, including emotions, are accompanied by psychogalvanic responses, the ambiguous results of studies in the PGR are easily explained. Sudden emotion is a strong impulse to action; hence the early positive results are explained. But startle is an even stronger motor impulse, which seems to account for the fact that the taboo words used by Syz produced such strong deflections. When a man's name is called unexpectedly, he is startled and gets ready for action -- which explains why his own name usually brings about the strongest PGR of all."

Peterson and Jung (1907) conceived that PGR might make a good "complex indicator," along with slow verbal reaction; and their results satisfied them that such was the case. Weisgerber (1951), using a PGR measure, found that his results did not verify the theory that perseveration depends on a general tendency of the nervous system to persist in activity in regard to either conscious perseverative phenomena or the autonomic system.

9. MAGNITUDE OF PGR.

The magnitude of PGR was subjected to experiments by Darrow (1927) and Nober (1958). Latency received treatment by Davis (1930) and Felsinger, Gladstone,

Yamaguchi & Hull (1947). Stimuli, especially stimulus words, have been treated by such eminent people as Wells & Forbes (1911); Smith (1922); Darrow (1929); Jones & Wechsler (1928); Haggard & Jones (1947); Kubis (1948); Johnson (1951); Vail (1955); Jacobs (1955); and Sutton (1958). These studies have direct bearing on the present research in which sixteen emotionally toned words are used.

10. PROJECTIVE TESTS AND PGR: - RELATIONSHIP.

The projective test and PGR have been interrelated by Fisher & Ambercrombie (1958) and Fisher (1958); through figure drawing, Fisher (1959); through the Rorschach, Kubis, Rockwell, Welsh & Fisichelli (1946); Levy (1958); Frost (1948); Levy (1950); Niimi, Hashimoto, Mochizuki & Ohno (1956); and Meissner (1958).

11. PERSONALITY TESTING AND PGR.

Most apropos to personality testing through the PGR, including the H-K Test itself, are studies done by Carter (1947); Cofer (1948); Hsu (1951); Albrecht (1952, 1957); Herr (1953); Herr & Kobler (1953, 1957); Kehres (1958); Cabanski (1958); and Williams (1960). The application of PGR testing to the clinical interview, personality typing and psycho-therapy is in the forefront

of PGR research today. Mall (1936) mentions the possibility following Verguth's lead, and more recently we have the works of Golla (1948); Neumann (1950); Seymour (1950); Van der Valk & Groen (1950); Rankin & Campbell (1955); Martin (1956); Dittes (1957); Gordon, Martin & Lundy (1959); Learmonth, Ackerly & Kaplan (1959); and Martin, Lundy & Lewin (1960).

12. SUMMARIES OF RESEARCH WORK IN PGR.

Good summaries of work done with PGR occur in Landis (1935); Cattell (1936); Woodworth (1938); McCleary (1956); Woodworth & Schlosberg (1954); and in the theses at Loyola University, such as those of Weisgerber (1951); Albrecht (1952, 1957); Kehres (1956); Cabanski (1958); Williams (1960); and Flanagan (1962).

13. PREVIOUS EXPERIMENTS.

Herr and Kobler (1953 & 1956) devised a "test" with emotionally toned words used as "stimuli" to gain "responses" of the first thing that came to the subject's mind, which response was to be given as quickly as possible. The psychogalvanic skin response was used as a measure of change in emotional response. Normal groups and diagnosed neurotics were tested, and a <u>ratio</u> score devised. The test on this basis, using college

students as normals, discriminated psychoneurotics and normals at the 0.01 level of confidence. MMPI was used as one of the measures of neuroticism in selecting the subjects for the experiment.

Cabanski (1958) made a comparison of the PGR responses gained from the test of 20 college students, against the MMPI Anxiety Index (AI) from the subjects. Williams (1960) ran the Taylor Manifest Anxiety Scale (derived from a part of the MMPI) against the PGR Ratio, employing seminarians as subjects. The mean responses to the 16 emotionally toned words in both the Williams and Cabanski experiments showed a close correspondence with responses reported in the previous studies of Herr and Kobler.

These studies show that the H-K PGR Test affords a measure of certain personality tendencies, and from the results of the Herr-Kobler double experiment a person would wonder why the Cabanski and Williams comparisons failed to show the correspondence of Anxiety with PGR Ratio. Perhaps this could be the result of inadequate "anxiety" measures, or, more probably, the PGR Ratio measures something more emotionally specific than "anxiety."

14. "ES" AND "IR" CORRELATION WITH PGR RATIO.

The Ego Strength measure of Barron for the MMPI might be a better indicator of "control of emotion" than the Anxiety Index, and better yet, the MMPI Internalization Ratio of Welsh seems to show something of the characteristic way a person manages in emotion-fraught situations. The data of Herr-Kobler and Cabanski, newly analyzed for IR and AI totals, show a positive correlation of high PGR Ratio (above 1.00) with high IR (Williams did not use the whole of the MMPI, and thus for him no IR is available).

Study	Subjects	Year	N	PGR R	MMPI IR	MMPI AI
Herr-Kobler	Neurotic Men	1956	20	1.28	1.17	.84
Herr-Kobler	Neurotic Men	1953	20	1.19	1.09	.93
Hoene	Women	1962	22	1.05	.90	.65
Cabanski	Collegiate Men	1958	20	0.95	.84	.45

With this observation of a trend, PGR R varying with MMPI IR, further experimentation and a testing for limits seem in order. The hypothesis of the present experiment affirms a correlation between the MMPI IR of Welsh and the Herr-Kobler PGR Ratio; furthermore on the basis of the experimenter's previous use of the PGR with female

subjects the correlation hypothesized should be negative, contrary to the positive correlation of the data for males listed above.

15. MEAN RESPONSE TO STIMULUS WORDS.

Such a hypothesis would be in accord with the noticed differences in response (men often answer "gun" to powder, while women say "puff") which men and women manifest through word association tests. An added hypothesis would be that the mean response to each of the words for the women should be similar to the mean responses for the men; this would mean that the ranks of the mean responses to the words should be similar for all the experiments just cited, and they actually turned out to be so, as will be seen later.

16. RESPONSE TO WORDS: NEUROTICS AND NORMALS.

The work of Herr and Kobler (1953) cleared the field for validating studies. The selection of emotionally toned words and the amount of response to these words elicited by neurotic and normal persons was carefully made and assessed.

> "It is useful to do an analysis of variance separately for each of the two groups of normal and neurotic subjects. Here the comparison is not between the two groups

> on any one word or for a series of words, but rather between words for either group considered alone. In this way one can determine the relative stimulus value of these words for the normal and the neurotic individuals."

Herr and Kobler found the neurotic to be more erratic (a significant difference in regard to variance, but not in regard to means) and the words God, pain, church and closed appeared to have different stimulus value for the two groups. Again, analysis of combined groups yielded significant differences in PGR between normals and neurotics. The so-called sex word grouping, love, sex and sweetheart, brought greatest responses in the normals. The religious words, sin and God, were tied in with the sex words for the neurotics. Through differential selection, since high, closed, open, pain and God evoked larger responses for the neurotics, while sick, sweetheart, trouble and church evoked larger responses from the normals, a ratio score was devised to serve as an index of neuroticism. The hypothesis was this: "The five words evoke more anxiety response in the neurotics than they do in the normals, and the four words inhibit such response in the neurotics but heighten it or some other kind of response in the normals." The ratio was that of the total five word response divided by the total four word response. Other measures were

applied as well, such as a comparison of responses to the buffer words, a comparison of number of mental blocks, i.e., situations in which four seconds or more were required by the subject to give a response to the stimulus word, and also the number of zero PGR's to stimuli.

17. RESEARCH DIRECTLY CONNECTED WITH H-K PGR TEST

Cabanski (1958) and Williams (1960) tested various possibilities and appeared to have defined some of the limits that this PGR test can reach in assessing such a vague factor as anxiety. Weisgerber's work (1954) on perseveration solved many questions that could be asked on temperature effects, and on the relation between mental and physiological perseveration. Kehres (1950) explored the possibilities of harassment of the subject (and indirectly the effect of rapport between S and E) in the taking of the H-K PGR Test. All of this experimentation has direct bearing on the H-K PGR Test.

18. NEGATIVE IR-PGR R CORRELATION - 0.57 WOMEN, HOENE STUDY, 1962

The overall correlation of MMPI IR and PGR R for the 1962 Hoene study on females is -0.57. Following

McNemar's (1956) illustration of analysis of variance, the correlation ratio is significant at or beyond the 0.05 level, but not at the 0.01 level (see the following page). The significance of the linear correlation is at or beyond the 0.01 level. Testing for linearity of regression, the values do not approach the 0.05 level even by half; the hypothesis of linearity is not disproved (the null hypothesis is not rejected). Thus, the correlation coefficient may be suitable, the function may be linear, and the personality factors so measured and expressed may be thought of as lying on a continuum.

To test the possibility of other scales of the MMPI being more in accord with the PGR Ratio, the Anxiety Index of Welsh and the Ego Strength Scale of Barron were scored and tabulated. The Anxiety Index had a fair correspondence (rough rank r. = -0.56) with the PGR Ratio. The ES showed little (rank r. = + 0.17) correlation with the PGR R.

		65	70	75	80	85	90	95	100	105	110	115	120	f_y
325	12		1											1
320	11													0
275	10			1										1
250	9													0
225	8													0
200	7	1												1
175	6													0
150	5						1							1
125	4		1			1								2
100	3		1			1								2
75	2					1		1						2
50	1				1	11	111	1	1					8
25	0								1	11				4
0														
$f_x = m_r$		1	3	1	1	5	4	2	2	2	0	0	1	22
Σy		7	9	10	1	11	8	3	1	0	0	0	0	Σ60
Σy^2		49	169	100	1	31	28	5	1	0	0	0	0	Σ384
$\Sigma y^2 / m_r$		49	120	100	1	24	16	4.5	.5	0	0	0	0	Σ315

Source	Sum of Squares	d.f.	Variance Estimate
L.R.	71.6	1	71.6
Dev.	55.8	8	6.97
Betw.	151	9	16.77
Within	69	12	5.75
Res.	148.8	20	7.44
Total	220.4	21	

1.) $384 - 60^2/22 = 220.4$

2.) $384 - 315 = 69$

3.) $315 - 60^2/22 = 151$

$n^2 = 151/220.4 = .687 = .69$

$n = -.83$

SCATTERGRAM CORRELATION $= -.57 \rightarrow r^2 = .3249$

a.) $(.3249)(220.4) = 71.6$

b.) $(1 - .3249)(220.4) = 148.8$

c.) $(.687 - .3249)(220.4) = 55.8$

F_1 SIGNIFICANCE OF CORRELATION RATIO 2.91 $n_1 = 9$ $n_2 = 12$
-SIGNIFICANCE AT AND BEYOND .05 (2.80 REQUIRED AT .05)

F_2 SIGNIFICANCE OF r (LINEAR CORRELATION) 9.62 $n_1 = 1$ $n_2 = 20$
-SIGNIFICANCE AT AND BEYOND .01 (8.10 REQUIRED AT .01)

F_3 LINEARITY OF REGRESSION? 1.21 $n_1 = 8$ $n_2 = 12$
NOT .05 LEVEL BY ½ (2.85 REQUIRED)

THUS HYPOTHESIS OF LINEARITY NOT DISPROVED.

DIAGRAM: SIGNIFICANCE OF CORRELATION BETWEEN IR AND PGR-R (HOENE, 1962)

19. CORRESPONDENCE OF HOENE STUDY WITH H-K PGR STUDIES

The hypothesis that female subjects would have scores of IR and PGR R with high negative correlation was borne out (product moment r. = -0.57) in the Hoene study. There was the further hypothesis that rank coefficient of correlation should be high for "responses (in PGR) to the sixteen words" run against the data of Herr-Kobler, Cabanski and Williams. This holds true; that is, the rank correlation (which correlates the ranks or orders of words, group mean response in one sample with group mean response in another in PGR for each of sixteen words) of Herr-Kobler groups with Williams was 0.90, with Cabanski 0.80 and with the Hoene data 0.78. The same rank correlation of word response of Cabanski with Williams was 0.94, and of Cabanski with the Hoene study 0.87. The same correlation of the Williams group with the Hoene study was 0.85. Thus, the results were consistent and comparable on the basis of the PGR mean responses, regardless of other personality variables and their effect upon the single person's total or mean or PGR Ratio score.

20. WOMEN AND MEN

Since the female subjects yielded scores on the Internalization Ratio from very high to very low, an analysis of this group in the threefold separation of the low five, middle twelve and the high five subjects, yielded the following correlations: the low IR scoring group with Herr-Kobler (totaled) 0.62; the high scoring group with the same, 0.76; the middle group, 0.70; the middle scoring group with Cabanski was 0.91 (his group was said to be middle or normal). These correlations indicate that women respond to the PGR Test somewhat similarly to men. This is borne out again by the similarity of mean responses, where the Herr-Kobler totaled mean was 303, the Cabanski mean, 443, the Williams mean, 342, and the present mean, 340. The "neurotics" of the groups for men and women have differing scores, and the middle groups are homogeneous through comparison of Cabanski's group with the present, and with the reported mean PGR R of 0.81 for the Herr-Kobler normal groups (Cabanski, 0.95, Hoene, 1.05).

21. IR-PGR R HIGH CORRELATION

The hypothesis that the way people manage their emotions be borne out through both MMPI and H-K PGR Test and that the Internalization Ratio and the H-K PGR Ratio show a high correlation was confirmed.

22. H-K PGR, MMPI, AND CLINICAL TESTING

A high correlation between the MMPI written test and the PGR Test of response to emotionally toned words measured through a physical means leads an experimenter to advance more questions. One of these would look to the possibility of the PGR Test as possibly providing a measure of the degree of those tendencies manifested in an MMPI profile. Again, if the Internalization Ratio, which taps six of the scales of the MMPI, can be correlated with the rather brief and straightforward Herr-Kobler PGR Test, then the possibilities of the use of this thirty minute test in conjunction with the clinical setting and procedure bears serious consideration. The fact that experimental psychologists of all times have worked with the psychogalvanometer, at first with enthusiasm and then with dismay, showed that there was some way of gaining a measure of emotional control (or its lack) if only they could put their finger on it. Seemingly the Herr-Kobler PGR Test offers one positive step in this direction.

23. Other Scales of the H-K PGR Test

The H-K PGR Test not only has the PGR Ratio scoring system available, but with the accurate record of seconds photographed at all times, and in addition for on-set of stimulus and for verbal reaction time, many other scales are

available. The scales constructed for the analysis are the Sum, which is simply the sum of all the Log PGR scores for the sixteen emotionally toned words, divided by 10; the Rt, which is sum of seconds recorded from the on-set of the stimulus (a word) to the beginning of the PGR deflection; the B/T ratio, with the log PGR score for the sixteen buffer words in summation divided by the log PGR score for the sixteen emotionally toned words in summation; and the R_{21}, the ratio of the log PGR of the second part of the test, in summation, divided by the log PGR total of the first part. All these scales were based on observation of subjects, available apparatus, and other research measures. The change in "basic" was considered as a possible source of scale construction, but was not included.

III. METHODOLOGY

1. Problem

The correlation between the PGR Ratio and Welsh's Internalization Ratio (IR) gave evidence of a continuum running from an extreme of persons who internalize difficulties through a more normal middle region to another extreme of those persons who externalize or act out in the face of difficulties. This continuum appears to refer to both men and women, but with this difference in scores, that the men have their two scores in positive correlation, the women in negative.

2. "MIDDLE" OF CONTINUUM AMBIGUOUS

By observation, certain persons scored in the "middle region" on both tests and thus fall into the "normal" category on this two dimensional system. Some of these have a balanced and constructive way of working out their difficulties, but others were quite unbalanced if one considered other scales and other criteria (such as judgment from peers), yet who escaped the scrutiny of the two ratios used as the selected measures for the correlation. From the nature of the IR, which is produced by dividing of the "mood" scores by the "character disorder" scores, such a case might be predicted, for one reason since a ratio score of unity is the theoretical norm of the IR,

and for another since the Lie score, Faking score, Paranoid (6) score and Schizoid (8) score do not enter into determination of the Ratio score.

3. THE "BALANCED" AND "APATHETIC" TO BE SEPARATED

Also, in the PGR Test it would seem that those persons who are relatively apathetic and who respond to any stimulus with about the same affect would end with a "middle" score rather than at an extreme. If so, they would be confused with the "balanced" individuals when lined up on the aforementioned continuum. Welsh has warned that the IR does not afford a good metric when several of the profile scores are elevated (above 70). The first problem, then, would be to effect this separation of the hypothesized normal and apathetic.

4. DISCRIMINATION NOT POSSIBLE THROUGH THESE MEASURES

The trouble is that the measures used heretofore do not have the selectivity to distinguish. Probably the "apathetic" would be people who do not characteristically act-out nor internalize their difficulties but rather deny that such exist and attempt a dream-world existence in which they perforce appear apathetic.

As a first exploration, it might be suggested that some other measures from the two "tests" be taken to see whether

the "middle group", at least, could be separated into normal and apathetic. However, neither of the tests seem to have single scales developed which will accomplish the separation.

5. A NEW TEST, WITH SCALES OF ALL 3 TESTS, BROUGHT TO BEAR

To effect the separation, and to explore the domain opened up through the separation, another personality test should be introduced, and the correlated test scores (on carefully selected variables) factor analyzed. The simple structure emerging from this very powerful technique should show whether an adequate separation has been effected, and also describe the relationships within the domain. Such a structure is the criterion of success and significance. The TAT Sequence Analysis should be an apt tool, since the TAT is a little different than the other two, relying as it does upon the person's own creative ability, and yet is similar in that it reveals a person's attitudes and characteristic manner of dealing in various situations. Through the TAT and the factor analysis, the separation is readily expected, and with this result a new dimension of personality will stand forth. The predicted dimensions are similar to those anticipated by Funkenstein, King & Drolette, or

by Rosenzweig with his extrapunitive, intropunitive dimensions, or by Cleckley who speaks of psychotic, neurotic and psychopathic. The problem of careful selection of scales and of identifying the factors which appear admittedly is not easy. To find at least three factors demands four or five scales belonging to each test. However, in this exploratory study, if the expected separation is effected and if a simple structure can be identified, then a process of accurate scale construction may be entered (at a future date) and multidimensional scaling carried out. It is expected that such scaling may be begun through the discriminant function. All three tests would profit by this research, and personality testing and theory advanced. Our problem is that of the first exploration.

6. The Steps

Sixty female subjects are tested with the three personality tests. The subjects are single women with age somewhere between 14 and 44 years. The MMPI is given in the booklet form, with its 566 statements judged "true" or "false".

The H-K PGR Test is administered while employing the Loyola Psychogalvanometer with its camera attachment. Log PGR and seconds of time in response are important measures to be

attained, so the readings which yield these measures are attended to with greater emphasis than are those of the specific word given in association following the instruction: "Give right away the first thing that comes to your mind." The slip of photographic paper is carefully developed and used for record through cross-checking with the written notes.

The TAT is given with the instructions that the subject write a story with the help of the cards, one story for each card. Twelve picture cards are used as the basis for the stories, always the F or GF cards for women being used where there is an option. The TAT card numbers are: 1, 2, 3, 4, 6, 7, 8, 10, 11, 13, 16 and 20; twelve in all. The subject is told to have something happen, that is, to concentrate on having a plot and an outcome. The TAT Story Sequence Analysis is the method used for scoring, with three judges scoring and a mean score tabulated.

7. EXPERIMENTAL PROCEDURE SPECIFIC TO H-K PGR TEST

a. Apparatus

A moving coil galvanometer with photographic registration was used. Changes in current flow accompanying the various responses were computed from records on which were written the ohms resistance before the stimulus and the ohms resistance

after the maximum drop. From these measures it was possible to compute change in ohms resistance, change in conductance, and to refer both of these to the basic resistance values. The verbal responses were recorded in writing, the reaction times through photographic recording.

The Loyola Psychogalvanometer (built by Herr and Osborn, 1953) was built with the special object of having a control over the amount of current through the subject, during the measurement of his galvanic reflex. The traditional "open" type bridge circuit always demands that different amounts of current flow through the different subjects, depending upon the amount of their basic bodily resistance; thus the comparison of one person's reflex with another becomes difficult or even meaningless without some complex transformation. Moreover, the open bridge will deliver so high a current to some low-resistance subjects that they become conscious of the current, and the purpose of the study o of the reflex is lost.

The main difficulty in the construction of this instrument comes from the fact that the "moving coil" galvanometer has to be critically damped, or else the swings of the beam will not reflect changes in current with the proper sequences or time-

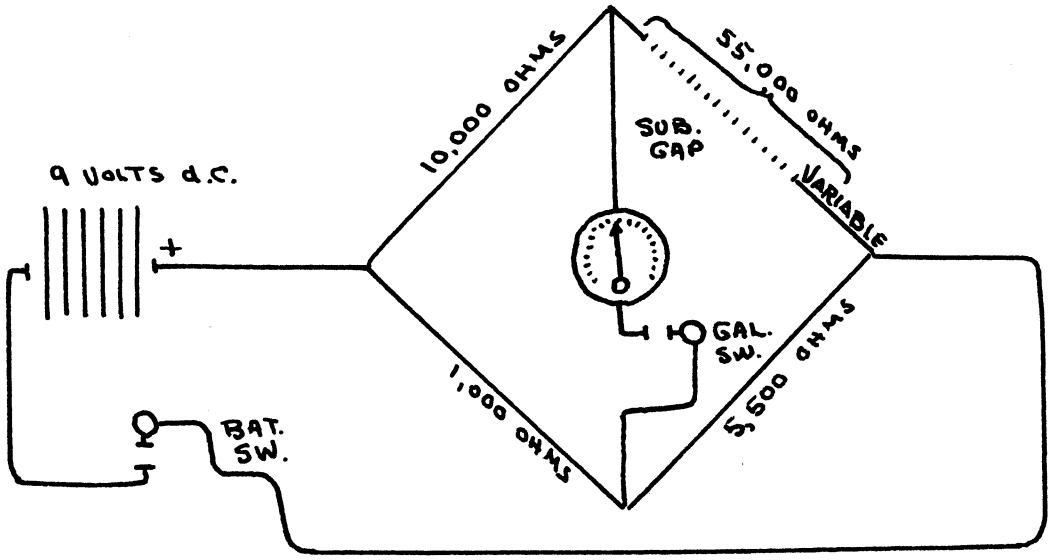
relations. Woodworth (1938) makes no mention of this difficulty when he describes the "closed" type machine, but he is not really discussing the galvanometer -- rather only the resistances in the various arms of the bridge. Having achieved a "constant current" through S when balanced, we now have variations in voltages, but within the ranges described in the following setup, these do not cause any notable difficulty.

The moving coil unit is produced by the G-M Laboratories. It is of the d'Arsonval type, very sensitive and yet very rugged, with a period of 4 sec., and sensitivity per mm. division of scale 160 mm. from mirror: 0.06 microamperes. Internal resistance of the moving coil is 100 ohms. External resistance needed for critical damping is 1000 ohms.

The unit is very easy to mount, since the arms of the magnets have flanges on which the whole suspension hangs. The knob on top of the unit is adjustable for the zero point, up to 30 degrees either way. The total swing is in angular deflection 40 degrees, and in reflected light, 80 degrees, this last being rarely usable with photographic paper but very useful for visual recording.

The construction of the bridge described below merely requires precision coils (load 1/2 watt) for the fixed arms,

and equally graduated steps in the two variable resistors, steps of 5000 ohms for the master and 500 for the vernier.



Since current through bridge is constant at all times, critical damping avoids all "free swings" of coil due to its own proper period of 4" and hence the deflections are true pictures of changes in "S". (Hence also the peculiar ratios.) Electrodes are of copper plate, 1/2 x 1-1/2 inches, immersed in 0.1 N saline solution in two cups, the solution to be stirred at intervals of ten minutes. Total current through the bridge when balanced =

0.000160 amp. (160 microamps). The measured change in current through S for a drop of 350 ohms is one (1) microampere increase. Voltages across S vary with his R. An S of 5,500 ohms has only 0.88 volts, whereas one of 50,000 ohms gets 8.0 volts. Mean R for this setup is 30,000 ohms; such a subject gets 4.80 volts, an optimum. An elaborated discussion of this type machine and its use may be found in Weisgerber's (1951) thesis.

b. Subjects

The subjects were given the H-K PGR Test on afternoons or in early evenings in a small, quiet room with the temperature varying from 70 to 75 degrees F.

c. The Stimulus List

Each subject in the PGR Test was given the same list of words and required to respond in the usual manner of free association, i. e., "say right away what you first think of". The list was especially prepared for testing the strength of the emotional responses. After each emotionally toned word there was inserted a neutral word. Four or five additional buffer words were used before each measured session in order to test the constancy of the basic resistance during the adaptation period.

The time required for the actual testing, with the buffer, emotional and non-emotional words, was on the average thirty minutes. The emotionally toned words in order of presentation are: sick, high, love, afraid, sin, closed, hospital, ashamed, sex, open, pain, God, sweetheart, trouble, church and breast. The buffer words were identical with those used previously in the Herr-Kobler, Cabanski and Williams experiments. Albrecht's theses (1952 and 1957) are worth consulting concerning the responses to words.

d. Computation

The Haggard transformation makes it possible for the results of the present investigation to be compared with the results obtained by Herr and Kobler (1953 & 1956), by Cabanski (1958), and by Williams (1960), all of whom used Haggard scores.

The criteria which Haggard suggests for the use of the transformation are (1) normalcy of distribution of Haggard Transformation scores; (2) equal interval scale across the whole range of basic resistances from high to low. These criteria are met for all three studies mentioned above, as may

be seen by plotting, as Herr did, the Herr-Kobler, Williams, and Cabanski converted Haggard scores against their respective basics.

e. PGR Ratio

PGR Ratio is derived from the transformed scores for five of the words (high, closed, open, pain and God) divided by scores for four of the words (sick, sweetheart, trouble and church). Mean ratios for 40 normal men are around 0.80, and range from 0.40 to 1.20, from previous studies. Mean ratios for 40 neurotics (men) were 1.24 and ranged from 0.70 to 2.20.

8. CORRELATIONS OF SCALES: IR, PGR R, AND ATTITUDES

Having scored the three tests, correlations are run between the internalization ratio scores of the MMPI, the PGR ratio on the H-K PGR Test, and the attitude rating on the TAT. These correlations are then compared with others reported in research, to get a better picture of their significance.

9. CONSTRUCTION OF OTHER SCALES

To more clearly effect the separation, and to more surely outline the dimensionality so tentatively effected, other

possible scales of the MMPI, H-K PGR and TAT are selected and tried for their "fit". It would be guessed that some of such scales would correlate poorly with the IR of the MMPI and the PGR R, but correlate well with the negative attitude, apathetic and schizophrenic scale of the TAT. There are more than single scales possible for each test; four others for the MMPI and H-K PGR Test and two others for the TAT are constructed.

10. CENTROID METHOD OF THURSTONE AND RADIAL ROTATION IN FACTOR ANALYSIS

Factor analysis following the centroid method of Thurstone makes up the next logical step; the rotation to simple structure may be carried out by the method of two-dimensional sections (radial rotation) also illustrated by Thurstone. The scales or variables are given the numbers 1 (IR); 2 (FaPaSc); 3 (AI); 4 (CI); 5 (SAR); 6 (E); 7 (Rt); 8 (PGR R); 9 (B/T R); 10 (R21); 11 (TATSc); 12 (TATPd); 13 (Att.); 14 (A); 15 (R); 16 (C); 17 (P); 18 (Fm); 19 (Fs). From 1-5 we have MMPI scales, from 6-10 the H-K PGR scales, and 11-13 the TAT scales, with 15-19 again from the MMPI, as factor scales.

11. SIGNIFICANCE OF STRUCTURE INDICATED THROUGH LOW INTERCORRELATION OF FACTORS

For comparison, the first factor analysis will be

run using scales one to thirteen (1-13), and the second factor analysis using scales five to nineteen (5-19). Cosine matrices will show the degree of intercorrelation of factors -- to be different factors, they should not correlate highly. Identification or "interpretation" of the factors found in the structure makes up the last major step. Scales with heavy loadings in the factors give clues to the identification.

12. GUILFORD'S STEPS IN FACTOR ANALYSIS

These steps follow the order suggested by Guilford (1959) in the design of factor-analysis investigations: (1) select an appropriate domain for investigation; (2) develop hypotheses concerning the factors in the domain; (3) suitable tests should be selected or constructed; (4) select a suitable population; (5) obtain a sample of adequate size; (6) extract the factors with communalities in the diagonal cells of the correlation matrix; then rotate reference axes; (7) interpret the rotated factors. An eighth step could be developed from Guilford's presentation of techniques, where he follows the "interpretation of factors" with an estimation of factors in persons.

13. THE 8TH STEP: ESTIMATION OF FACTORS IN PERSONS THROUGH DISCRIMINANT FUNCTION

With respect to this eighth step, Fisher's discriminant function has application, employing scales with high loadings in a factor (the function can be calculated four times so that each factor is assessed) as a basis for selection. The location of the subjects in "space" through their 'z' scores obtained in this discriminant analysis (Johnson, 1949, Johnson & Johnson, 1959) may be considered as a beginning of multi-dimensional scaling. The results can be roughly checked, for we should not expect young nuns to be as "far out" as a group of delinquents.

IV. RESULTS AND ANALYSIS OF DATA

A. RESULTS

1. CORRELATIONS

The correlation of IR with PGR R fell from -0.56 in the earlier study to -0.25 in the present, in this case with the use of 60 subjects. The correlation of IR with $\pm$ ATT. of the TAT is $\pm$0.37. That of PGR R with TAT $\pm$ ATT. is -0.13. On the basis of these correlations, no one would expect to accurately distinguish the "normal" from the "apathetic" as they lie along the internalisation-externalisation continuum. However, the correlations are not impossibly low, so the next step is in order, that is, the correlation of the first 13 variables and their placement in a matrix for multiple factor analysis.

2. FACTOR ANALYSIS I

The arithmetic means of the variables and the standard deviations of the 60 subjects in 13 variables are calculated (Table 1). The correlation matrix is laid out (Table 2). The factorial solution is fairly clear cut in four factors, though the 4th factor is rather weak (Table 3). The centroid method was used. The rotation to structure by the two-dimensional sections, radial method (Table 4) yields a solution and an oblique simple structure which warrants

identification of factors (Figure 1). Factor 1 appears to be internalization with its heavy loadings in test or variables 5 (sarx) and 1 (internalization side of Welsh's IR). Factor 2 appears to be apathy or schizoid tendency, with its heavy loadings in negative attitude (variable 13) and in variable 2 (part of which is Sc scale). Factor 3 may well be externalization or psychopathic tendency, with its big loading in PGR R (variable 8). Factor 4 is more closely associated with factor 1, and if so considered, may be taken as an integration factor, a factor of balance. It has moderate loadings in variable 1. It may contain some of the chance or apparent "balance" of manic-depression.

3. DISCRIMINANT ANALYSIS TO ASSESS FACTOR SCORES, 60 CASES

The discriminant function was applied next, where, factor by factor the 60 subjects were put to scrutiny. The 60 were divided tentatively into two groups on the basis of higher or lower scores in the scales or "tests" mentioned. The discrimination was made three times, for the three factors, 1, 2, and 3, leaving a "good" group and a "bad" group each time. The results are distinct. This good and bad designation is in accord with the idea

that people handle difficulties badly in three ways. Those cases or subjects who ended in the "good" group in all three scrutinies were considered to have some degree of balance, and were found to be providing much of the variance for factor 4. The discriminations are shown in Figure 2, A, B, and C.

The results of analysis I indicate oblique simple structure. Such was the postulate, so that the hypotheses connected with this exploratory factor analysis have been confirmed. However, scrutiny of table 5, showing the intercorrelation matrix which may act as a kind of "test of significance", reveals some fairly high cosines, which would mean considerable overlap and some dependence of factors. However, the cosines are small enough to be acceptable in such an exploration. The obvious procedure would be to continue the analysis, and while this meant weeks of calculation, the work was undertaken.

4. OBLIQUE SINGLE STRUCTURE THROUGH ANALYSIS II

With the purpose of dropping the IR (variable 1) from the factor analysis for sake of exploration, a second factor analysis was run. The variables 5 through 19 were employed, with variable 5 used as a tag and with the MMPI "factors" of Welsh introduced as scales. An oblique structure similar to that of the first emerged, in accord with Welsh's findings of A (anxiety), R (repression), C (control) and P (psychotic). However, the A and P are related, and P is not greatly separated from C (cosine = -.357).

5. CLEAR SOLUTION-SMALL COSINES OF CORRELATION

The second structure is a rather clear solution, more definite than the first, as borne out by the smaller cosines in the second of the two cosine matrices (Table 5). Guilford (1954) finds a cosine as large as -.481 acceptable, so the -.357 is acceptable in this case. In the second oblique structure, factors 3 with 4 present this fairly large cosine, which would mean that 3 and 4 are not as independent of each other as are factors 1 and 2 and 3 - 4.

A design (Figure 6) of the two structures emphasizes the similarities of the two analyses.

6. THREE FACTORS OF MALADJUSTMENT

The structure manifests three factors of maladjustment: schizoid anxiety, impulsive "repression" and over-control or internalizing. The fourth factor (psychotism?) picks up a bit of the first and third, and thus is weak, mixed and relatively ambiguous. Perhaps factor 4 distinguishes the manic-depressive from the internalization of factor 3. The first and second factors emerging in the second analysis are judged prominent as a result of dropping the Internalization Ratio and adding Welsh's factor scales.

7. DISCRIMINANT FUNCTION IN ESTIMATING FACTORS IN PERSONS

The process of estimating factors in persons admittedly has its difficulties, for we cannot obtain factor scores directly. A limited list of factor scores would do the work of several times as many tests and do it with greater variance of meaning. Now, there are several ways in which we can derive factor scores. We could construct a pure test for a factor, but there are very few known factors

for which we have pure scores. Practical methods attempt to maximize in the score the variance in factors that we want to measure. Guilford (1954) lists the multiple-regression equation method and the suppression method. The discriminant function method does not differ greatly from the first mentioned method.

8. DEFINITE SEPARATION BY FACTORS

Following analysis I, scales 1, 5 and 6 were combined and higher scores from the sixty cases were selected as predictors of internalization, or factor 1. The discriminant function was applied and yielded 2 scores, means and standard deviations for two groups, showing a good separation of cases (Figure 2B) into a group of internalizers and another group. Similarly, scales 2 and "minus" 13 were combined and the sixty cases discriminated for the presence of factor 2 (schizoid). The rather clear separation into two groups emerged through this analysis (Histogram, Figure 2A). Finally, scales 8, 10 and 12 were combined and the discriminant analysis run as in the other two factor-score estimates. The result (Histogram, Figure 2C) showed a bimodal group of

cases loaded in factor 3 distinguished from another group not so loaded. Judged by factor loadings and the comparison of intercorrelation matrices the second factor analysis brought a better structure. The discriminant function brought to bear upon the four factors of this structure four times yielded clearer separations of groups each time with definite numbers of cases loaded (and z scores scaled) in factors 1, 2, 3 and 4. (Histograms 4A, B, C and D). The t tests in each discrimination were statistically significant beyond the .001 level.

9. ANALYSIS (%) OF CASES (NUNS, WORKING GIRLS, DELINQUENTS) WITH PRESENCE OF FACTORS

Analysis of the cases which showed the presence of these factors in relatively high degree (Table 7) yielded for schizoid tendency: delinquents, 68%; working girls, 29%; nuns, 4%; for psychopathic tendency: delinquents, 50%; working girls, 21%; nuns 28%; internalizing-self-blaming tendency: delinquents, 50%, working girls, 29%; nuns, 21%; for manic-depressive tendency: delinquents, 32%; working girls, 21%; nuns, 47%.

10. PLOT OF CASES IN 3D SPACE

A plot of the sixty cases using z scores derived from discriminant analysis was tentatively arranged (Figure 5). The location in space emphasizes the hypothesis that the cases with high loadings are persons with problems and that in the face of difficulties they adjust poorly but characteristically.

B. ANALYSIS OF DATA

1. INTERPRETATION OF THE FACTORS AS Sc, R, PR AND INT OR C

The interpretation of factors in analysis may often present major difficulties. Thus, two analyses were run with a change of MMPI variables to facilitate the interpretation here. Variable 5 was retained as a marker. In the analyses, Variable 5 was highly loaded in factor 1 of analysis I, and in factors 2 and 3 of analysis II (Tables 4 and 6). Now, factors 2 and 3 of analysis II appear to be much the same factors that Welsh has found in his factoring of the MMPI. These factors he calls R (repression) and C (control - lack of control). Because the highest loading of variable 5 is in factor 3 of analysis II, this third factor was judged to be over-

controlled internalizing. This would leave factor 2 to be more clearly "repression", separated from internalizing, and inclusive of impulsive lack of control. Factor 2 seems to be Welsh's second factor (see variable 15, Table 6), and since this is the case it points the way to a future investigation about the validity of "repression" as a construct. The impulsive side of factor 2 is indicated especially by variables 7, 8, 12, 13 and 14. The similarities of factors 1 and 4 of analysis I and of factors 3 and 4 of analysis II may be contributed by a depressive element in both, namely, the pessimism attendant with internalization and the depressive phase of manic depression. The higher loading of variable 17 ("psychotism") in factor 4 would tend to support this interpretation of the ambiguous factor, along with the rather moderate loading of this same variable compared with what it might be if derived from a mentally disturbed population.

2. IR AND PGR R CORRELATION AND LOADINGS; Sc SEPARABLE

When we turn to the analysis of the 19 scales, it is interesting to note that the relationship of IR (Variable 1)

and PGR R (Variable 8) brought about through means of the two factor analyses is relatively high negative correlation. That is, the loadings of IR (Variable 1) in analysis I are .773 and .370 in factors 1 and 4, while the loadings of PGR R (Variable 8) are -.138 and -.398, respectively, (analysis I), -.001 and -.040 (factors 3 and 4, analysis II). It had been predicted that this relationship (IR with PGR R) would hold up. It had also been predicted that another factor could be distinguished from whatever factors they represented: the Sc factor was extracted.

3. ASSESMENT OF CONTRIBUTIONS OF SCALES IN THE BATTERY

Several of the scales of the MMPI were quite similar and could have been eliminated. They were included largely for the sake of exploration. Scales 11 and 12 of the TAT did not operate too effectively. These are the Sc and Pd scales of Vasiliou. Consequently, a third scale for the TAT of "internalization" will be introduced at some later date with the hope that the Sc and Pd scales would thereby be purified. The strongest scale of the H-K PGR evidently is the PGR R (Variable 8), constructed by the author of that test to differentiate neurotics from normals. While the H-K PGR in general did not contribute to the factor analysis

as powerfully as did the MMPI and the TAT (see the "communalities", Table 3), still variable 6, 7 and 10 as well as 8 were of some value in identification of the factors extracted. The use of these new scales in this analysis can lead to a future development of the H-K PGR as an ever more accurate instrument.

4. REPRESSION AND Pd.

The linking of "repression" with "psychopathic deviation" really isn't too far fetched notionally, so that the joining of the scales in this analysis and the identification of the factor (factor R or Pd) as one or the other may be considered legitimate. "Repression" may be thought of as a method of protecting a person from full awareness of impulses that she would prefer to deny. If the impulse is denied rather fully, we have the mechanism of repression. Suppression, in contrast, is considered to be more rational and conscious. Now, the delinquent girl is impulsive, more often than not. So it would be expected that some of this impulsivity would be "repressed," and that a group noteworthy for poorly guided impulse would manifest considerable "repression."

5. WELSH'S "A" AS SCHIZOID: ARIETTI

In treating Welsh's A factor as the Schizoid factor, Cattell's (1963) view on anxiety is not particularly followed,

but the naming comes closer to the meaning of the Sc scale (part of variable 2) of the MMPI which has a high loading in Factor A of "Sc", and to the etiological naming by Arieti (1959): "Schizophrenia is a specific reaction to an extreme state of anxiety, originated in childhood and reactivated later in life by psychological factors."

6. INTERNALIZING AND ITS GROUNDING IN "ESTIMATION"

To find the internalizing, self-blaming, highly sensitive factor to be fairly clearly distinguished from both "repressing" and "anxious" would be unexpected by many theorists. It was postulated here because it was considered as a consequent if a person were to consistently estimate situations as dangerous and life as difficult and herself as responsible to the extreme. Thus the importance of theorizing carefully, and the special contribution which "estimation" makes towards the formation of the present hypotheses become underlined and emphasized by the rather clear cut results.

V. SUMMARY OF CONCLUSIONS

1. THREE "ESTIMATIVE" DIMENSIONS OF PATHOLOGY

It was proposed that persons manage poorly in the face of difficulties in some one of three major ways, and that through the factor analysis of 19 variables in three personality tests, the MMPI, the H-K PGR and the TAT, the extrapunative, intrapunitive and impunative tendencies postulated by Rosenzweig could be clearly delineated. Because the approach was made on a broader basis than that of Rosenzweig, namely, reacting in the face of difficulties in place of "reaction to frustration" and estimation in place of "apperception," the factors hypothesized were those of psychopathic lack of control, internalizing self-blame and schizoid-apathy.

2. OBLIQUE SIMPLE STRUCTURE THROUGH FACTOR ANALYSIS I AND II

The oblique, simple structure resulting from the factor analysis yielded three independent factors (cosines were small), with a fourth factor that was interpreted as possible "manic-depressive" reaction. The correspondence of a first and preliminary factor analysis with the second and more conclusive analysis aided considerably in the interpretation of the factors.

3. ASSESSMENT OF FACTORS IN PERSONS (Z SCORES THROUGH D FUNCTION)

The estimation of factors in persons was attempted through use of Fisher's discriminant function. Employing discriminant analysis for three factors resulting from the first factor analysis

(analysis I) and for four factors resulting from the second factor analysis (analysis II), cases or persons possessing these factors or "loaded" in them were definitely distinguished from other cases (t-tests were significant, beyond the 0.01 level) and were assigned factor z scores. The delinquent girls, making up about half of the sample of sixty young women, were shown to possess these factors of maladjustment in higher proportion, especially in the anxiety or schizoid factor and when the ambiguity of the fourth factor was brought into consideration. The estimation of factors in the persons of this sample through means of the discriminant analysis thus led to a confirmation of the earlier interpretation of factors and to the inception of a multi-dimensional scaling.

4. POOR ADJUSTMENT IN THREE MAJOR WAYS BORNE OUT

It could be concluded that, through the factor analysis of the MMPI, the H-K PGR and the TAT, employing 19 variables and with scores derived from the testing of sixty young women as subjects, people in the face of difficulties, if they do not adapt appropriately, adjust poorly in three major, characteristic ways: (1) they deny the difficulty and in consistently doing so live in a world of dream and apathy; (2) they impulsively act out or engage in rash, aggressive behavior, akin to the psychopath; or (3) they turn the difficulty against themselves, to internalize the blame, and end in pessimistic attitudes. Perhaps there is another minor maladjustment manifested through the factor analysis which could be

tentatively identified as manic-depression. Thus the hypotheses have been confirmed.

BIBLIOGRAPHY

Abel, T.M. Verbal report in problem solving. J. exp. Psychol, 1930, 13, 47-60.

Abramowski, E. Recherches experimentales sur la volante. J. de Psychol. norm. et pathol., 1913, X, 491-508 and 1915, XII, 14-43, 88-118.

Ader, R. The effects of early experience on subsequent emotionality and resistance to stress. Psychol. Monogr., 1959, 73, 31 pp.

Albrecht, E. An experimental investigation of the constancy of psychogalvanic responses and ratios. Unpublished master's thesis, Loyola Univ., 1952.

Albrecht, E. PGR in a threat situation. Unpublished doctoral dissert., Loyola Univ., 1957.

Alexander, L. Apparatus and method for the study of conditioned reflexes in man. A.M.A. Arch. neurol. Psychol., 1958, 80, 629-49.

Allport, G.W. Personality: a psychological interpretation. New York: Holt, 1937.

Anastasi, A. Psychological Testing. New York: Macmillan, 1954. Second ed. 1961.

Apfelbaum, B.E. & A. C. Sherriffs. Factors influencing ratings of recalled experiences. J. Pers., 1954, 22, 557-64.

Arieti, S. Schizophrenia: other aspects; psychotherapy. In S. Arieti (Ed.), American Handbook of Psychiatry. New York: Basic Books, 1959, Vol I, Part III, Ch. 24.

Armington, J.D. An electronic psychogalvanometer for student use. J. Psychol., 1949, 28, 3-7.

Arnold, M.B. An excitatory theory of emotion. In M. L. Reymert (Ed.), Feelings and Emotions: The Moosheart Symposium. New York: McGraw-Hill, 1950, 11-33.

Arnold, M.B. Physiological differentiation of emotional states. Psychol. Rev., LII, 1945, 35-48.

Arnold, M.B. Emotion and Personality. Vol. I, Psychological Aspects. 296 pg. Vol. II, Neurological and physiological aspects, 430 pg. New York: Columbia Univ. Press, 1960.

Arnold, M.B. A screening test for candidates for religious orders. In V. V. Herr (Ed.), Screening Candidates for the Priesthood and Religious Life. Chicago: Loyola Univ. Press, 1962.

Arnold, M.B. Story Sequence Analysis. In M. B. Arnold (Ed.), New York: Columbia Univ. Press, 1962.

Aronfreed, J.M., S. A. Messick & J. C. Diggory. Re-examining emotionality and perceptual defense. J. Pers., 1953, 21, 517-28.

Aronson, A.E. Latency and magnitude of the GSR as related to long and short auditory stimuli. Dissert. abstr., 1957, 17, 2069-2070.

Aronson, A.E., J.E. Hind & J.W. Irwin. GSR auditory threshold mechanisms: effect of tonal intensity on amplitude and latency under two tone-shock intervals. J. speech Res., 1958, 1, 211-219.

Ashby, W.R. & M. Bassett. The effect of prefrontal leucotomy on the psychogalvanic response. J. ment. Sci., 1950, 96, 458-469.

Aveling, F. A better index of conation, including effort and striving, than of feeling and emotion. Internat. Cong. Psychol., 1926, 8, 227-234.

Ax, A.F. The physiological differentiation of fear and anger in humans. Amer. Psychologist, 1951, VI, 271.

Bagchi, B.K. & D.A. Greenwald. Electrodermal changes during certain types of attention. J. gen. Psychol., 1937, 17, 235-248.

Baker, L.M. & W.M. Taylor. The relationship under stress between changes in skin temperature, electrical skin resistance and pulse rate. J. exp. Psychol., 1954, 48, 361-366.

Bard, P. The neuro-humoral basis of emotional reactions. In C. Murchison (Ed.), A Handbook of General Experimental Psychology. Worcester: Harvard Univ. Press, 1934, 264-311.

Barratt, E.S. Anxiety and impulsiveness related to psychomotor efficiency. Percept. mot. Skills, 1959, 9, 191-198.

Barron, F. Some test correlates of response to therapy. J. consult. Psychol., 1953, 17, 235-241. (Also reprinted in Welsh, G.S. & W.G.Dahlstrom, Basic Readings.

Bartholomew, A.A., C.M. Franks & B. Marley. Susceptibility to menthylpentynol: eyelid conditioning and PGR response. J. ment. Sci., 1958, 104, 1167-1173.

Bartlett, R. J. PGR during mental activity. Br. J. Psychol., 1927, 18, 30-50.

Bassett, M. & W. R. Ashby. The effect of electroconvulsive therapy on the PGR. J. ment. Sci., 1954, 100, 632-642.

Bayley, N. A study of fear by means of the psychogalvanic technique. Psychol. Monogr., 1928, 38, 176, 1-38.

Behr, K., L. Preber & B. P. Siltverskjold. Recording of the skin resistance in thermal and rotory stimulation of the labyrinth. Octa. psychiat. Koh., 1955, 30, 741-748.

Berry, J. L. & B. Martin. GSR reactivity as a function of anxiety, instructions and sex. J. abnorm. soc. Psych., 1957, 54, 9-12.

Bierbaum, W.B. Temporal aspects in conditioning the GSR. Dissert. abstr., 1955, 15, 1655.

Bitterman, M.E. & H. Holtzman. Conditioning and extinction of the galvanic skin response as a function of anxiety. J. abnorm. Psychol., 1952, 47, 615-623.

Bitterman, M.E. & H. Holtzman. Conditioning and extinction of the galvanic skin response in relation to clinical evidence of anxiety. U.S.A.F. Sch. Aviat. Med., 1952, Proj. 21-37-002, Rep. 3 v., 232 p.

Bitterman, M.E., P.C. Reed & A. L. Kubala. The strength of sensory pre-conditioning. J. exp. Psychol., 1953, 46, 178-182.

Bitterman, M.E., J. Krauskopf & W. H. Holtzman. The GSR following artificial reduction of the basal resistance. J. comp. physiol. Psychol., 1954, 47, 230-234.

Black, J.D. The interpretation of MMPI profiles of college women. Ph.D. dissert., Univ. of Minnesota, 1953. (Dissert. abstr., 1953, 13, 870-871.)

Bloch, V. New aspects of the psychogalvanic method as a criterion of effective tensions. Amer. Psychologist, 1952, 52, 329-362.

Bloch, V. New researches on the "psychogalvanic" method and its utilization as a criterion of affective tension. Rev. Neurol., 1952, 86, 168-171.

Block, J.D., F.L. Rouke, M.M. Salpeter, E. Tobach, J.F. Kubis, & L. Welch. An attempt at reversal of the truth-lie relationship as measured by the PGR. J. Psychol., 1952, 34, 55-66.

Block, J. A study of affective responsiveness in a lie-detection situation. J. abnorm. Psych., 1957, 55, 11-15.

Bordley, J.E. & W.G. Hardy. A study in objective audiometry with the use of a PGR. Ann. Otol., St. Louis, 1959, 58, 751-760.

Brower, D. The relations between MMPI scores and cardiovascular measures before and after experimentally induced visuo-motor conflict. J. soc. Psychol., 1947, 26, 55-60.

Brower, D. The relations of visuo-motor conflict to personality traits and cardio-vascular activity. J. gen. Psychol., 1948, 38, 69-99.

Buck, K.W. Traditional and psychogalvanic skin response audiometry. J. speech Res., 1958, 1, 275-278.

Burdick, H.A. & A.J. Burnes. A test of "strain toward symmetry" theories. J. abnorm. soc. Psychol., 1958, 57, 367-370.

Burkard, Sr. M.I. Characteristic differences determined by TAT sequential analysis, between teachers rated by their pupils at the extremes of teaching efficiency. Ph.D. dissert., Chicago, Loyola Univ., 1958.

Cabanski, S. Anxiety index and the Herr-Kobler PGR test. Unpublished master's thesis, Loyola Univ., 1958.

Calvin, A.D. & C. Hanley. An investigation of dissimulation on the MMPI by means of the "lie detector". J. appl. Psychol., 1957, 41, 312-316.

Cardu, B. Physical and psychological factors in the galvanic reflex of the skin. Amée Psychol., 1954, 54, 345-356.

Carpenter, J.A. Effects of alcoholic beverages on skin conductance: an exploratory study. Quart. J. Stud. Alcohol, 1957, 18, 1-18.

Carter, H.L.J. A combined oral reading and psychogalvanic response technique for investigating certain abilities in reading of college students. J. appl. Psychol., 1950, 34, 267-269.

Carter, H.L.J. A combined projective and PGR technique for investigating certain affective processes. J. consult. Psychol., 1947, 11, 270-275.

Cattell, R.B. The psychical correlate of the psychogalvanic reflex. Br. J. Psychol., 19, 1929, 357-386.

Cattell, R.B. Physiological approaches and methods, in Ch. VI, Probes of Character. A Guide to Mental Testing. London: Univ. of London Press, 1936, XVI, 258-266.

Cattell, R.B. The nature and measurement of anxiety. Scientific American, March 1963, 96-104.

Cattell, R.B. & G. F. Stice. Handbook for the 16 Personality Factor Questionnaire. Champaign, Ill: Institute for Personality and Ability Testing, 1957 & 1962.

Chaiklin, J.B. The conditioned GSR auditory speech threshold and its relationship to selected voluntary auditory speech thresholds. Dissert. abstr., 1958, 19, 883-884.

Chaiklin, J.B. The conditioned GSR auditory speech threshold. J. speech hear. Res., 1959, 2, 229-236.

Champion, R.A. Studies of experimentally induced disturbance. Austral. J. Psychol., 1950, 2, 90-99.

Champion, R.A. The calibration of GSR as an indicant of a psychological dimension. Austral. J. Psychol., 1951, 3, 99-108.

Charan, K.K. & R. Goldstein. Relation between EEG pattern and ease of eliciting electrodermal responses. J. speech Disord., 1957, 22, 651-661.

Claparede, E. Pourquoi baille-t-on? Intermed. des educateurs, 1924.

Clausen, J., A. Gjesvik & A. Urdal. Changes in GSR as indication of pain threshold. J. gen. Psychol., 1953, 49, 261-271.

Clausen, J., A. Urdal & A. Gjesvik. Relation between GSR and repetition effect in pain stimulation. J. gen. Psychol., 1955, 53, 29-36.

Cleckley, H. Psychopathic states. In S. Arieti (Ed.), American Handbook of Psychiatry. New York: Basic Books, 1960, Ch. 28, 567-588.

Clerc, N.A., M. Turner & E. Berard. Electrodermographic, sweat and skin temperature changes provoked by chlorpromazine in man. E.E.G. clin. Neurophysiol., 1956, 8, 35-39.

Conklin, J.E. Three factors affecting the general level of electrical skin-resistance. Amer. J. Psychol., 1937, 21, 202-210.

Cook, S.W. & R. E. Harris. The verbal conditioning of the galvanic skin reflex. J. exp. Psychol., 1937, XXI, 202-210.

Coombs, C.N. Adaptation of the galvanic response to auditory stimuli. J. exp. Psychol., 1938, 22, 244-268.

Cooper, J.B. & H. E. Siegel. The GSR as a measure of emotion in prejudice. J. Psychol., 1956, 42, 149-155.

Cooper, J.B. & D. N. Singer. The role of emotion in prejudice. J. soc. Psychol., 1956, 44, 241-247.

Copelman, L.S. The use of psychogalvanic phenomena. Année Psychol., 1951, 51, 53-60.

Copelman, L.S. New research on the importance of PGR in neuropsychiatry. Ann. med-psych., 1957, 2, 226-230.

Coppock, H. A test for an assumed property of the hypothetical construct of fear. Proc. Ind. Acad. Sci., 1949, 58, 292.

Coppock, H. W. Responses of subjects to their own GSR's. J. abnorm. soc. Psychol., 1955, 50, 25-28.

Coppock, H.W. & R. M. Chambers. GSR conditioning: an illustration of useless distinction between "types" of conditioning. Psychol. Rep., 1959, 5, 171-177.

Dahlstrom, W.G. & G. Welsh. An MMPI Handbook. Minneapolis: Univer. Minnesota Press, 1960.

Darrow, C.W. Sensory, secretory and electrical changes in the skin following bodily excitation. J. exp. Psychol., 1927, X, 197-226.

Darrow, C.W. Differences in the physiological reactions to sensory and ideational stimuli. Psychol. Bull., 1929, 26, 185-201.

Darrow, C.W. Electrical and circulatory responses to brief sensory and ideational stimuli. J. exp. Psychol., XII, 1929, 267-300.

Darrow, C. W. Reference to the above. Int. Cong. Psychol., 1929, 9, 136-137.

Darrow, C.W. PGR: circuits and electrodes. J. gen. Psychol., 1930, 4, 418-420.

Darrow, C.W. & L. L. Heath. Reaction tendencies relating to personality. In K. S. Lashley (Ed.), Studies in the Dynamics of Behavior. Chicago: Univ. Chicago Press, 1932, 59-261.

Darrow, C.W. The sweat glands in PGR. J. gen. Psychol., 1932, 7, 261-273.

Darrow, C.W. The galvanic skin reflex (sweating) and blood pressure as preparatory and facilitative functions. Psychol. Bull., 33, 73-94.

Darrow, C.W. Neural mechanisms controlling the palmar galvanic skin reflex and palmar sweating: a condideration of the available literature. Arch. Neurol. Psychiat., Chicago, 1937, 37, 641-663.

Darrow, C.W. The equation of the galvanic skin reflex curve. J. gen. Psychol, 1937, 16, 285-309.

d'Arsonval, A. Remarques a propos de la production d'electricite chez l'homme. C.R. Soc. Biol. Mem., 1888, 40, 142-144.

Davis, R.C. Factors affecting the galvanic reflex. Arch. Psychol. N. Y., 1930, #115.

Davis, R.C. Modification of the galvanic reflex by daily repetition of the stimulus. J. exp. Psychol., 1934, 17, 504-535.

Davis, R.C. Responses to meaningful and meaningless sounds. J. exp. Psychol., 1948, 38, 744-756.

Davis, R.C. Motor effects of strong auditory stimuli. J. exp. Psychol., 1948, 38, 257-275.

Davis, R.C. & J. R. Kantor. Skin resistance during hypnotic states. J. gen. Psychol., 1935, 13, 62-81.

Davis, R.C. & J. M. Porter. Measuring the GSR. J. gen. Psychol., 1931, 5, 115-120.

Dittes, J.E. Extinction during psychotherapy of GSR accompanying embarrassing statements. J. abnorm. soc. Psychol., 1957, 54, 181-191.

Dittes, J. E. GSR as a measure of patients' reaction to therapist's permissiveness. J. abnorm. soc. Psychol., 1957, 55, 295-303.

Dixon, N.F. The effect of subliminal stimulation upon autonomic and verbal behavior. J. abnorm. soc. Psychol., 1958, 57, 29-36

Doerfler, L.G. Neurophysiological clues to auditory activity. J. Hearing Disorders, 1948, 13, 227-232.

Doerfler, L.G. & C.T. McClure. The measurement of hearing loss in adults by GSR. J. speech Hearing Disorders, 1954, 19, 184-189.

Doerfler, L.G. & J. C. Krammer. Unconditioned stimulus strength and the GSR. J. speech hear. Res., 1959, 2, 184-192.

Dreher, R.E. The relationship between verbal reports and galvanic skin responses to music. Amer. Psychol., 1948, 3, 275-276.

Duffy, E. Emotion: An example of the need for reorientation in psychology. Psychol. Rev., 41, 1934, 184-198.

Dysinger, D.W. A comparative study of affective responses by means of the impressive and expressive methods. Psychol. Monogr., 1931, 41, 187, 14-31.

Eckstrand, G. & A. R. Gilliland. The psychogalvanic method for measuring the effectiveness of advertising. J. appl. Psychol., 1948, 32, 415-425.

Elliott, D. N. & E. G. Singer. The Paintal index as an indicator of skin resistance changes to emotional stimuli. J. exp. Psychol., 1953, 45, 429-430.

Ellis, N.R. & W. Sloan. The relationship between intelligence and skin conductance. Amer. J. ment. Defic., 1958, 63, 304-306.

Eriksen, C.S. Some implications for TAT interpretation arising from need and perception experiments. J. Pers., 1951, 19, 282-288.

Eriksen, C.W. Perceptual defense as a function of unacceptable needs. J. abnorm. soc. Psychol., 1951, 46, 557-564.

Eriksen, C.W. Defense against ego-threat in memory and perception. J. abnorm. soc. Psychol., 1952, 47, 230-235.

Eschenbach, A.E. & L. Dupree. The influence of stress on MMPI scale scores. J. clin. Psychol., 1959, 15, 42-45.

Essen, K.W. & M. Hansen. Does the GSR remain constant in normal persons and how does it change with physical work? Z. ges. exp. Med., 1940, 107, 590-602.

Eysenck, H.J. Levels of personality, constitutional factors and social influences: an experimental approach. Int. J. soc. Psychiat., 1960, 6, 12-24.

Eysenck, H. J. The Structure of Human Personality. London: Methuen, 1953.

Farmer, E. & E. G. Chambers. Concerning the use of PGR in psychological experiments. Br. J. Psychol., 1925, 15, 237-254.

Felsinger, J.M., A. Gladstone, H. Yamaguchi & C. L. Hull. Reaction latency as a function of the number of reinforcements. J. exp. Psychol., 1947, 37, 214-228.

Fere, C. Note sur les modifications de la resistance electrique sous l'influence des excitations sensorielles et des emotions. C.R. Soc. Biol. Mem., 1888, 40, 217-219.

Fisher, J. An empirical study of the relation of physical disease to body-object cathexis. A progress report. Unpublished manuscript, 1957.

Fisher, R.A. The use of multiple measurements in taxonomic problems. Annals of Eugenics, 1936, 7, 179-188.

Fisher, S. Body image and assymetry of body reactivity. J. abnorm. soc. Psychol., 1958, 57, 292-298.

Fisher, S. Body reactivity gradients and figure drawing variables. J. consult. Psychol., 1959, 23, 54-59.

Fisher, S. & J. Abercrombie. The relationship of body image distortions to body reactivity gradients. J. Pers., 1958, 26, 320-329.

Flanagan, J. J. An experimental investigation of the relationship between the psychogalvanic response and the conscious intensity of emotional response. Doctoral dissert., Chicago, Loyola Univ., June 1962.

Flanagan, Jr., J. & V.V. Herr. Ascendence-submission and the PGR to mild stress. Psychol. Rep., 1959, 5, 289-292.

Flanders, N.A. A circuit for the continuous measurement of palmar resistance. Amer. J. Psychol., 1953, 66, 295-299.

Forbes, T.W. Measuring PGR. Amer. J. Physiol., 1936, 117, 189-199.

Forbes, T.W. & M. M. Bolles. The Tarchanoff wave. J. Psychol., 1936, 2, 273-285.

Forbes, T. W. & C. Landis. The limiting A.C. frequency for the exhibition of the PGR. J. gen. Psychol, 1935, 13, 188-193.

Foulds, G.A. & T. M. Caine. The assessment of some symptoms and signs of depression in women. J. ment. Sci., 1959, 105, 182-189.

Fraisse, P. & M. Jampolsky. First investigations of the fhythmic induction of PGR and the estimation of duration. Annee Psychol., 1952, 52, 363-381.

Fraisse, P. & V. Bloch. Psychogalvanic activity and speed in a complex sensory-motor test. Acta. Psychol., 1957, 13, 127-139.

Freeman, G.L. Relationship between performance level and bodily activity level. J. exp. Psychol., 1940, 26, 602-608.

Freeman, G.L. A method of inducing frustration in human subjects and its influence upon palmar skin resistance. Amer. J. Psychol., 1940, 53, 117-120a.

Freeman, G.L. & C. W. Darrow. Insensible perspiration and the GSR. Amer. J. Physiol., 1935, 111, 55-63.

Freeman, G.L. & E. T. Katzoff. Methodological evaluation of the GSR, with special reference to the formula for deriving the recovery quotient. J. exp. Psychol., 1942, 31, 239-248.

Frost, C.F. The relationship between the verbal and galvanic skin responses to the Rorschach test for schizophrenic and normal subjects. Dissert. abstr., 1948.

Frost, C.F. & E. H. Rodnick. The relationship between Rorschach determinants and the concommitant GSR for schizophrenic and normal subjects. Amer. Psychologist, 1948, 3, 277.

Fujiki, R., S. Sadakata, H. Saito, & K. Endo. Pain and GSR. Folia psych. neur. Jap., 1958, Suppl. 5, 68.

Funkenstein, D.H., S. H. King & M. Drolette. The experimental evocation of stress. In Symposium on Stress. Div. of Med. Sciences Nat. Res. Council and Army Med. Serv. Grad. School, W. Reed Army Med. Center. Washington, D.C., GPO, 1953.

Funkenstein, D.H., S. H. King & M. Drolette. The Mastery of Stress. Cambridge: Harvard Univ. Press, 1957.

Furer, M. & J. D. Hardy. The reaction to pain as determined by the galvanic skin response. Res. Publ. Ass. nerv. ment. Dis., 1950, 29, 72-89.

Garvin, J.A. A thematic apperception test study of non-intellective factors related to academic success on the college level. Ph.D. Dissert., Loyola Univ., 1960.

Gasson, J.A. Personality theory: a formulation of general principles. In M.B. Arnold & J. A. Gasson (Eds.) The Human Person. New York: Ronald Press, 1954.

Gildemeister, M. PGR Handbook. Norm. & Path. Physiol., 1928, 8, 657-702; 766-784.

Girden, E. The GSR "set" and acoustical threshold. Amer. J. Psychol., 1952, 65, 233-243.

Gladstone, A.I., H.G. Yamaguchi, C.L. Hull & J. M. Felsinger. Some functional relationships of reaction potential and related phenomena. J. exp. Psychol., 1947, 37, 510-526.

Goadby, K.W. & H. E. Goadby. The nervous pathway of the PGR. J. Physiol., 1948, 108, 177-184.

Goldstein, R., S. B. Polito-Castro, J. T. Daniels. Difficulty in conditioning electrodermal responses to tone in normally hearing children. J. speech hearing Disorders, 1955, 20, 26-34.

Golin, E. & S. B. Lyerly. The GSR as a test of advertising impact. J. appl. Psychol., 1950, 34, 440-443.

Golla, F. Electrophysiology in psychiatry. In N. G. Harris (Ed.), Modern Trends in Psychological Medicine. 1948.

Goodenough, F.L. The use of free association in the objective measurement of personality. In Q. McNemar & M. A. Merrill (Eds.), Studies in Personality. New York: McGraw-Hill, 1942.

Gordon, J.J. Some stimulus conditions for the learning of the GSR under different rates of recovery of the GSR. Dissert. abstr., 1955, 15, 1263.

Gordon, J.E., B. Martin & R.M. Lundy. GSR's during repression, suppression and verbalization in psychotherapeutic interview. J. consult. Psychol., 1959, 23, 243-251.

Gough, H.G. Diagnostic patterns on the MMPI. J. clin. Psychol., 1946, 2, 23-37.

Grant, D.A. Analysis-of-variance tests in the analysis and comparison of curves. Psychol. Bull., 1956, 53, 141-154.

Grant, D.A., D. R. Meyer & H. W. Hake. Proportional reinforcement and extinction of the conditioned GSR. J. exp. Psychol., 1950, 43.

Grant, D.A. & A. S. Patel. Effect of electric shock stimulus upon the conceptual behavior of "anxious" and "non-anxious" subjects. J. gen. Psychol., 1957, 57, 247-256.

Grant, D.A. & J. J. Schiller. Generalization of the conditioned GSR to visual stimuli. J. exp. Psychol., 1953, 46, 309-313.

Grant, D.A. & D. E. Schneider. Intensity of the conditioned stimulus and strength of conditioning. J. exp. Psychol., 1949, 39, 35-40.

Grant, D.A. & D. E. Schneider. Intensity of the conditioned stimulus and strength of conditioning of the GSR. Amer. Psychologist, 1947, 2, 348.

Greenberg, L.A. & J. A. Carpenter. The effect of alcoholic beverages on skin conductance and emotional tension: wine, whiskey and alcohol. Quart. J. stud. Alcohol, 1957, 18, 190-204.

Grings, W.W., E. L. Lowell & G. Rushford. Role of conditioning in GSR audiometry with children. J. speech hear. Disorders, 1959, 24, 380-390.

Grings, W.W. & D. E. O'Donnell. Magnitude of response to compounds of discriminated stimuli. J. exp. Psychol., 1956, 52, 354-395.

Grings, W.W. & V.N.Shmelev. Changes in GSR to a single stimulus as a result of training on a compound stimulus. J. exp. Psychol., 1959, 58, 129-133.

Guertin, W.H. & P. L. Wilhelm. A statistical analysis of the electrodermal response employed in lie detection. J. gen. Psychol., 1954, 51, 153-160.

Guilford, J. P. Psychometric Methods. New York: McGraw-Hill, 1954.

Guilford, J.P. Personality. New York: McGraw-Hill, 1959.

Haggard, E.A. Experimental studies of affective processes II on the quantification and evaluation of "measured" changes in skin resistance. J. exp. Psychol., 1945, 35, 46-56.

Haggard, E.A. On the application of analysis of variance to GSR data: I The selection of an appropriate measure. J. exp. Psychol., 1949, 39, 378-392; 861-867.

Haggard, E.A. & W. R. Garner. An empirical test of a derived measure of changes in skin resistance. J. exp. Psychol., 1946, 36, 59-70.

Haggard, E.A. & R. Gerbrands. An apparatus for the measurement of continuous changes in palmar skin resistance. J. exp. Psychol., 1947, 37, 92-98.

Haggard, E.A. & H. E. Jones. The comparative discriminatory value of various measures of GSR for words of differing affective value. Amer. Psychol., 1947, 2, 349.

Hall, C.S. & G. Lindzey. Theories of Personality, New York: Wiley & Sons, 1957.

Hanely, C.N., W.R.Tiffaney & J. Brungard. Skin resistance changes accompanying the sidetone test for auditory malingering. J. speech Res., 1958, 1, 286-293.

Hansel, C.E.M. Measurement of "group responses". Quart. Bull. Br. Psychol. Soc., 1951, 2, 6-7.

Hathaway, S.R. & J.C. McKinley. The Minnesota Multiphasic Personality Inventory Manual. Revised. New York: The Psychological Corp., 1951.

Hathaway, S.R. & P.E. Meehl. The MMPI. In Military Clinical Psychology. Dept. of the Army, Technical Manual, TM 8-242; Dept. of the Air Force Manual, AFM 160-45, 1951.

Hathaway, S.R. & E.D. Monachesi. The personalities of pre-delinquent boys. J. crim. Law Criminol. police sci., 1957, 48, 149-163.

Heinze, H. Adaptability of PGR reflex for the objective measurement of fatigue. Psychol. Beitr., 1955, 2, 98-127.

Heistad, G.T. Effects of chlorpromazine and electroconvulsive shock on a conditioned emotional response. J. comp. physiol. Psychol., 1958, 51, 209-212.

Henkin, R.I. The prediction of behavior response patterns to music. J. Psychol., 1957, 44, 111-127.

Herman-Yale-Efron. Some personality correlates of the learning of the GSR. Dissert. abstr., 1954, 14, 404-405.

Herr, V.V. & F. J. Kobler. A psychogalvanometric test for neuroticism. J. abnorm. soc. Psychol., 1953, 48, 410-416.

Herr, V.V. & F. J. Kobler. Further study of psychogalvanometric test for neuroticism. J. clin. Psychol., 1957, 13, 387-390.

Herr, V.V. & F. J. Kobler. Instructions and personality type as related to GSR changes. J. gen. Psychol., 1957, 57, 297-305.

Hind, J.E., A.E. Aronson & J. W. Irwin. GSR auditory threshold mechanisms: instrumentation, spontaneous response and threshold definition. J. speech Res., 1958, 1, 220-226.

Hoch, P., J.P. Kubis & F. L. Rouke. Psychogalvanometric investigations in psychoses and other abnormal mental states. Psychosom. Med., 1944, 6, 237-243.

Hoene, R.E. Welsh"s IR of MMPI and H-K PGR ratio. Master's thesis, Loyola Univ., Chicago, 1962.

Holtzman, W.H. & M.E. Bitterman. Adjustment to stress; a factorial study of selected measures. Amer. Psychologist, 1954, 9, 395.

Horney, K. Our Inner Conflicts. New York: Norton, 1945.

Hovey, H.B. MMPI profiles and personality characteristics. J. consult. Psychol., 1953, 17, 142-146.

Hovland, C.I. The generalization of conditioned responses. J. exp. Psychol., 1937, 21, 261-276.

Hovland, C.I. & A. H. Rieser. Magnitude of galvanic and vasomotor response as a function of stimulus intensity. J. gen. Psychol., 1940, 23, 103-121.

Howes, D.H. & R. L. Solomon. A note on McGinnis' "emotionality and perceptual defense." Psychol. Rev., 1950, 57, 229-234.

Hozawa, A. First effects of impressed current. Ar. ges. Physiol., 1928, 219-111-158.

Hsu, E.H. A method for isolating presumptive personality profiles from changes in skin conductivity during word association tests. Psychosom. Med., 1951, 13, 260-261.

Hudgins, C.V. Conditioning and voluntary control of the pupillary light reflex. J. gen. Psychol., 1933, 8, 3-51.

Hulbert, S.F. Drivers' GSR's in traffic. Percept. mot. Skills, 1957, 7, 305-315.

Hull, C.L., J.M. Felsinger, A. I. Gladstone, H.G. Yamaguchi. A proposed quantification of habit strength. Psychol. Rev., 1957, 54, 327-254.

Hussman, Jr., T.A. The relationship between psychogalvanic activity and pilot performance under simulated instrument flying conditions. Dissert. abstr., 1955, 15, 2310.

Irwin, J.V., J.E. Hind & A.E. Aronson. Experience with conditioned GSR audiometry in a group of mentally deficient individuals. Train. Sch. Bull., 1957, 54, 26-31.

Iwahara, S., K. Miseki, N. Shiokawa & R. Yoshida. GSR to forced lying and personality traits. Tohoku J. exp. Psychol., 1955, 1 (3), 82-85.

Jacobs, A. Formation of new associations to words selected on the basis of reaction-time-GSR combination. J. abnorm. soc. Psychol., 1955, 51, 371-377.

James, H.E. & R. H. Thouless. Study in PGR. Br. J. Psychol., 17, 49-53.

Janda, E.J. On the relationship between anxiety and night vision. Ph.D. dissert., Univ. of Michigan, 1951.

Jeffress, L.A. Galvanic phenomena of the skin. J. exp. Psychol., 1928, 11, 130-144.

Johnson, P.O. Statistical Methods in Research. New York: Prentice-Hall, 1949.

Johnson, P.O. & R.W.B. Johnson. Modern Statistical Methods. Chicago: Rand-McNally, 1959.

Johnson, W.R. Psychogalvanic and word association studies of athletes. Res. Quart. Am. Assoc. Hlth., 1951, 22, 427-433.

Jones, H.E. The GSR in infants. Child Devel., 1930, 1, 106-110.

Jones, H.E. The retention of conditioned emotional reactions in infancy. J. genet. Psychol., 1930, 37, 485-498.

Jones, H.E. The study of patterns of emotional expression. In M. L. Reymert (Ed.), Feelings and Emotions. New York: McGraw-Hill, 1950, 161-168.

Jones, H.E. & E.A. Haggard. On the application of analysis of variance to galvanic skin response data. Amer. Psychol., 1948, 3, 255-256.

Jones, H.E. & D. Wechsler. Galvanometric technique in studies of association. Amer. J. Psychol., 1928, 40, 607-612.

Jorgensen, C. A short form of the MMPI. Austral. J. Psychol., 1958, 10, 341-350.

Jost, H. Some physiological changes during frustration. Child Develop., 1941, 12, 9-15.

Jost, H. The Use of Polygraphic Techniques in Psychophysiological Research and Clinical Psychology. Chicago: Associated Research, Inc., 1953.

Jost, H., C.J.Ruilmann, T.S. Hill & M. J. Gulo. Studies in hypertension. J. nerv. ment. Dis., 1952, 115, 35-38; 152-162.

Jurko, M., H. Jost & T.S. Hill. Pathology of the energy system. J. Psychol., 1952, 33, 183-198.

Kassebaum, G.G., A.S. Couch & P. E. Slater. The factorial dimensions of the MMPI. J. consult. Psychol., 1959, 23, 226-236.

Kehres, P.S. The effect of instructions on the magnitude of the psychogalvanic skin reflex. Master's thesis, Loyola Univ., 1956.

Kennard, M.A. Pain threshold and the galvanic skin response in patients with chronic severe pain. EEG clin. Neurophysiol., 1950, 2, 361.

Kleitman, N. & A. Ramsaroop. Periodicity in body temperature and heart rate. Endocrinology, 1948, 43, 1-20.

Kleitman, N. The sleep-wakefulness cycle. Problems of Consciousness. In H.A. Abramson (Ed.). New York: Macy, Jr. Foundation, 1950.

Klubertanz, G.L. The Philosophy of Human Nature. New York: Appleton-Century-Crofts, 1953.

Klubertanz, G. P. The nature of science and the teaching of high school chemistry. J. chem. Educ., 1955, 248-252.

Knapp, P.H. & B. H. Gold. The galvanic skin response and diagnosis of hearing disorders. Psychosom. Med., 1950, 12, 6-22.

Knauf, V.H. The effects of cortical ablations in monkeys on the GSR to pure-tone stimulation. Speech Monogr., 1954, 21, 212-213.

Kubis, J., F. Rockwell, L. Welch & V. Pisichelli. Changes in palmar skin resistance during Rorschach experiments. Amer. Psychologist, 1946, 1, 287.

Kubis, J.F. Adaption of the psychogalvanic response (PGR) to a visual, auditory and ideational stimulus. Amer. Psychologist, 1948, 3, 256.

Kuppers, W. Higher mental processes and GSR. Z. exp. ange. Psychol., 1954, 2, 291-320.

Kushner, M. The effects of experimentally induced stress upon critical flicker frequency palmar skin resistance, and reversible figure fluctuation. Dissert. abstr., 1955, 15, 2583-2584.

Lacey, O.L. An appropriate unit for the measurement of the level of galvanic skin characteristics. Amer. Psychologist, 1946, 1, 441.

Lacey, O.L. An analysis of the appropriate unit for use in the measurement of level of galvanic skin resistance. J. exp. Psychol., 1947, 37, 449-457.

Lacey, O.L. & P. S. Siegel. An appropriate unit for the measurement of the galvanic skin response. Amer. Psychologist, 1947, 2, 349.

Lacey, O.L. & P. S. Siegel. A simple circuit for the measurement of galvanic skin response and of the level of galvanic skin resistance. Amer. Psychologist, 1947, 2, 398.

Lacey, O.L. & P. S. Siegel. An improved potentiometric circuit for measuring the galvanic skin response. Amer. J. Psychol., 1948, 61, 272-274.

Lacey, O.L. & P.S. Siegel. An analysis of the unit of measurement of the GSR. J. exp. Psychol., 1949, 39, 122-127.

Lacey, O.L., P.S. Siegel & H. Stuckey. The relation of body morphology to galvanic skin conductance and response. Amer. Psychologist, 1948,3, 329.

Lacey, O.L., P.S. Siegel & H. S. Siegel. The relation of body morphology to galvanic skin conductance and response. Amer. J. Psychol., 1949, 62, 430-432.

Landis, C. Review of recent work in PGR. Psychol. Rev., 1930, 37, 381-398.

Landis, C. Electrical phenomena of the skin. Psychol. Bull., 1932, 29, 693-752.

Landis, C. & H. N. DeWick. The electrical phenomena of the skin (psychogalvanic reflex). Psychol. Bull., 1929, 26, 64-119.

Landis, C. & T. W. Forbes. PGR in sleep and waking states. Psychiat. Quart., 1933, 7, 107-114.

Landis, C. & W. A. Hunt. The conscious correlates of the GSR. J. exp. Psychol., 1935, 18, 505-529.

Langfeld, H.S. A response interpretation of consciousness. Psychol. Rev., 1931, 38, 87-108.

Langworthy, O. & C. P. Richter. The influence of efferent cerebral pathways upon the sympathetic nervous system. Brain, 1930, 53, 178-193.

Lanier, L.H. An experimental study of "affective conflict". J. Psychol., 1941, 11, 199-217.

Lazarus, R.S., C. W. Eriksen & C. P. Fonda. Personality dynamics and auditory perceptual recognition. J. Pers., 1951, 19, 472-482.

Lazarus, R.S. & R.R. McCleary. Autonomic discrimination without awareness: a study of subception. Psychol. Rev., 1951, 58, 113-122.

Learmonth, G.J., W. Ackerly & M. Kaplan. Relationships between palmar skin potential during stress and personality variables. Psychosom. Med., 1959, 21, 150-157.

Leeper, R.W. A motivational theory of emotion to replace "emotion as disorganized response." Psychol. Rev., 1948, 55, 5-21.

Lester, D. An automatic range-selector for the continuous registration of skin resistance. Amer. J. Psychol., 1958, 71, 437-441.

Levy, E.Z., V. H. Thaler & G. E. Ruff. New technique for recording skin resistance changes. Science, 1958, 128, 33-34.

Levy, J.R. Changes in the GSR accompanying the Rorschach test. Amer. Psychologist, 1948, 3, 335.

Levy, J.R. Changes in the GSR accompanying the Rorschach test. J. consult. Psychol., 1950, 14, 128-133.

Lewinsohn, P.M. Personality correlates of duodenal ulcer and other psychosomatic reactions. J. clin. Psychol., 1956, 12, 296-298.

Liberson, W.T. Research on the skin galvanic response in mental patients. EEG clin. Neurophysiol., 1949, 1, 251.

Lindsley, D.B. Emotion. In S.S. Stevens (Ed.), Handbook of Experimental Psychology. New York: Wiley, 1957,

Littman, R.A. Conditioned generalization of the galvanic skin reaction to tones. J. exp. Psychol., 1949, 39, 868-882.

Longenecker, E.D., J. Krauskopf & M. E. Bitterman. Extinction following alternating and random partial reinforcement. Amer. J. Psychol., 1952, 65, 580-587.

Lowenfeld, J., S. Rubenfeld & G. M. Guthrie. Verbal inhibition in subception. J. gen. Psychol., 1956, 54, 171-176.

Maier, N.R. F. Frustration theory: restatement and extension. Psychol. Rev. 63, 1956, 370-388.

Mall, G.D. The psychogalvanic reflex. Z. ps. Erganz. bd., 1936, 25, 13.

Mandler, G., J.M. Mandler & E. T. Uviller. The perception of autonomic activity. J. abnorm. Psychol., 1958, 56, 367-373.

Marenina, A.I. Electrometric method of dynamic measurement of the resistance of the surface of the skin. Fiziol. Zh. SSSR., 1949, 35, 722-727.

Marinesco, G., L. Copelman & I. Stanescu. An introductory note to criminal psychology. Anal. Psychol., 1937, 4, 315-317.

Martin, B. Galvanic skin conductance as a function of successive interviews. J. clin. Psychol., 1956, 12, 91-94.

Martin, B., R.M. Lundy & M. H. Lewin. Verbal and GSR response in experimental interviews as a function of three degrees of therapist communication. J. abnorm. soc. Psychol., 1960, 60, 234-240.

Masserman, J.H. Is the hypothalmus a center of emotion. Psychosom. Med., 1941, 3, 3-25.

McCandlish, L.A. An investigation of a new method of TAT analysis by a prediction study of high and low academic achievers. Ph.D. dissert., Loyola Univ., Chicago, 1958.

McCleary, R.A. & R.S. Lazarus. Autonomic discrimination without awareness: an interim report. J. Pers., 1949, 18, 171-179.

McCleary, R.A. The nature of the galvanic skin response. Psychol. Bull., 1950, 47, 97-117.

McClelland, D.C. Personality: an integrative approach. In J. L. McCary (Ed.), Psychology of Personality. New York: Logos Press, 1956.

McCurdy, H.G. Consciousness and the galvanometer. Psychol. Rev., 1950, 57, 322-327.

McDowall, R.J. The physiology of the psycholgalvanic reflex. Quart. J. exp. Physiol., 1933, 23, 277-285.

McGinnies, E. Emotionality and perceptual defense. Psychol. Rev., 1949, 56, 244-251.

McGinnies, E. Discussion of Howes' & Solomon's note on "emotionality and perceptual defense." Psychol. Rev., 1950, 57, 235-240.

Meehl, P.E. Clinical vs. Statistical Prediction. Minneapolis: Univ. of Minnesota Press, 1954.

Meehl, P.E. & W. G. Sahlstrom. Discriminating psychotic from neurotic MMPI profiles. J. consult. Psychol., 1960, 24, 5, 375-387.

Meissner, W.W. Affective response to psychoanalytic death symbols. J. abnorm. Psychol., 1958, 56, 295-299.

Meritser, C. & L. Doerfler. The conditioned GSR under two modes of reinforcement. J. speech hearing Disord., 1954, 19, 350-359.

Merlin, V.S. Experimental method for studying the properties of general types of higher nervous activity in man utilizing skin-galvanic index. Vop. Psikhol., 1958, 4, 159-192.

Michels, M.W. & C.T. Randt. Galvanic skin response in the differential diagnosis of deafness. Arch. Otolaryng., Chi., 1947, 45, 302-311.

Miller, C. Consistency of cognitive behavior as a function of personality characteristics. J. Pers., 1954, 23, 233-249.

Misbach, L.E. Effect of pitch of tone-stimuli upon resistance and cardiovascular phenomena. J. exp. Psychol., 1932, 15, 167-183.

Mitchell, L.E. The effect of tranquilizing drugs on conditioning rate of GSR in a group of psychiatric patients. Dissert. abstr., 1958, 19, 573.

Mizushima, K. Changes in galvanic skin conductance and respiration resulting from failure experience. Jap. J. Psych., 1954, 25, 165-173.

Moeller, Jr.,G.O., The role of the CS-UCS interval in conditioning the GSR. Dissert. abstr., 1953, 12, 595-596.

Moeller, Jr., G.O. The CS-UCS interval in GSR conditioning. J. exp. Psychol., 1954, 48, 162-166.

Montagu, J.D. The PGR: a comparison of A.C. skin resistance and skin potential changes. J. Neurol. Neurosurg. Psychiat., 1958, 21, 119-128.

Morris, R.P. An exploratory study of some personality characteristics of gamblers. J. clin. Psychol., 1957, 13, 191-193.

Mundy-Castle, A.C. & B. L. McKiever. The psycho-physiological significance of the GSR. Proc. soc. African Psychol. Assn., 1952, 3, 23.

Mundy-Castle, A.C. & B. L. McKiever. The psychophysiological significance of the GSR. J. exp. Psychol., 1953, 46, 15-24.

Murray, H.A. Thematic Apperception Test. Cambridge, Mass.: Harvard Univ. Press, 1943.

Mussen, P.H. & H. K. Naylor. The relationship between overt and fantasy aggression. J. abnorm. soc. Psychol., 1954, 49, 235-240.

Neumann, E. A study of palmar skin resistance. Ph.D. dissert., Brown Univ.

Nichols, R.C. & T. Daroge. An electronic circuit for the measurement of the GSR. Amer. J. Psychol., 1955, 68, 455-461.

Niimi, Y. & H. Hashimoto. Experimental studies of GSR centered on the unit of measurement and the diminution effect. Jap. J. Psychol., 1953, 24, 29-39.

Niimi, Y., H. Hashimoto, K. Mochizuki & I. Ohmo. Galvanic skin responses during Rorschach test adm. Jap. J. Psychol., 1956, 37, 175-184.

Nober, E.H. An investigation of the magnitudes of GSR responses that occur with different intensity levels of shock conditioned tone and extinction tone. USN Sch. Aviat. Med. res. Rep., 1958, Jet. Proj. #N.M. 180299, Sub. 1 #75 ii 34 p.

Noble, C.D. Conditioned generalization of the galvanic skin response to a subvocal stimulus. J. exp. Psychol., 1950, 40, 15-25.

Notterman, J.M., W.N. Schoefeld & P.J. Bergh. A comparison of three extinction procedures following heart rate conditioning. J. abnorm. soc. Psych., 1952, 47, 674-677.

Novak, S., R. Hayes, J. Goodman & L. Welch. The effect of an avoidance situation on the PGR. J. Psychol., 1955, 40, 307-311.

Novak, S., D. Moriarty, M. Koltuv & L. Welch. The effect of increased trials on the stability of the PGR in an avoidance situation. J. Psychol., 1956, 41, 243-246.

Novikova, L.A. & E.N. Sokolov. Investigation of the EEG and the motor and skin galvanic responses in the orienting and conditioned reflexes in man. Zh. vyssh. nervn. Deiatel', 1957, 7, 363-373.

Obrist, P.A. GSR conditioning and anxiety as measured by basal conductance. Amer. Psychologist, 1958(a), 13, 524.

Obrist, P.A. An investigation of the claim of autonomic discrimination without awareness and the relationship of GSR conditioning to measures of skin conductance. Ph.D. dissert., Univ. of Rochester, 1958 (b).

O'Connor, N. & P.H. Venables. A note on the basal level of skin conductance and Binet I.Q. Br. J. Psychol., 1956, 47, 148-149.

Ohira, K. Similarity of the GSR in twins. Jap. J. Psychol., 1956, 27, 15-21.

Ohira, K. A study on the basic factor of character through the GSR. Jap. J. educ. Psychol., 1958, 5, 110-115.

Oswald, I. Experimental studies in rhythm, anxiety and cerebral vigilance. J. ment. Sci., 1959, 105, 269-294.

Otani, S. Relations of mental set and change of skin resistance to ESP score. J. Parapsych., 1955, 19, 164-170.

Paintal, A.S. A comparison of the galvanic skin responses of normals and psychotics. J. exp. Psychol., 1951, 41, 425-428.

Panel, D.M. & B. Martin. The relationship between GSR and speech disturbances in psychotherapy. J. abnorm. Psychol., 1959, 58, 402-405.

Patterson E. A qualitative and quantitative study of the emotion of surprise. Psychol. Monogr., 1930, 40, #181, 85-108.

Peterson, F. & C. Jung. Psychophysical investigation with the galvanometer and pneumograph in normal and insane individuals. Brain, 1907, 30, 153-218.

Petrauskas, F.B. A TAT and picture-frustration study of naval offenders and non-offenders. Ph.D. dissert., Loyola Univ., Chicago, 1959.

Porter, J.M., Jr. Adaptation of the galvanic skin response. J. exp. Psychol., 23, 553-557.

Prideauz, E. The psychogalvanic reflex, a review. Brain, 1920, 43, 50-73.

Prideaux, E. Circuits and electrodes. Br. J. Psych. Med. Sec., 1921, 2, 23-46.

Proctor, P.W. The GSR as a function of difference between individual reading achievement and class reading achievement: a comparative study of the amplitude and frequency of the GSR of children in a reading situation who have reading ability below, equal to and above the average for their class. Dissert. abstr., 1953, 13, 354-355.

Pryer, R.S. & N. P. Ellis. Skin conductance and autonomic ability as a function of intelligence in mental defectives. Amer. J. ment. Defic., 1959, 63, 835-838.

Pumroy, D.K. & W. S. Kogan. A validation of measures that predict the efficacy of shock therapy. J. clin. Psychol., 1958, 14, 46-47.

Quinn, T.L. Differences in motivational patterns of college student Brothers as revealed in the TAT, the ratings of their peers, and the ratings of their superiors; a validation study. Ph.D. dissert., Loyola Univ., Chicago, 1961.

Rankin, R.E. & D. T. Campbell. Galvanic skin resistance to negro and white experimenters. J. abnorm. soc. Psych., 1955, 51, 30-33.

Rao, S. Psychogalvanic reflex and its application to crime detection. Indian J. Psych., 1946, 21, 46-55.

Raphelson, A.C. The relationships among the imaginative direct verbal and physiological measures of anxiety in an achievement situation. J. abnorm. soc. Psych., 1957, 54, 13-18.

Redlich, F.C. Organic and hysterical anesthesia: a method of differential diagnosis with the aid of GSR. Amer. J. Psychiat., 1945, 102, 318-324.

Renzaglia, G.A. Some correlates of the self-structures as measured by an index of adjustments and values. Ph.D. dissert., Univ. of Kentucky, 1952. Dissert. abstr., 1952, 12, 784-785.

Richter, C.P. The significance of changes in the electrical resistance of the body during sleep. Proc. Natl. Acad. Sci., 1926, 12, 214-222.

Richter, C.P. Physiological factors involved in the electrical resistance of the skin. Amer. J. Physiol., 1929, 88, 596-615 (a)

Richter, C.P. The sympathetic exerts a tonic influence on sweat glands of the palm, and it can also arouse them to momentary spurts of greater activity. Johns Hopkins Hosp. Bull., 1929, 45, 56-74(b).

Richter, C.P. & B.G. Woodruff. Facial patterns of electrical skin resistance; their relation to sleep, external temperature, hair distribution, sensory dermatones, and skin disease. Johns Hopkins Hosp. Bull., 1942, 70, 442-459.

Richter, C.P., B.G. Woodruff & B. C. Eaton. Hand and foot patterns of low electrical skin resistance: their anatomical and neurological significance. J. Neurophys., 1943, 6, 417-424.

Rigby, M.K., E.D. Ossorio & J. W. Lingner. Attitude characteristics of women serving in the Navy and Marine Corps. Dept. Psychol. Tech. Rep. #10, St. Louis Univ., 1958, 50 pp.

Rockwell, F.V., L. Welch, J. Kubis & V. Fisichelli. Changes in palmar skin resistance during the Rorschach test. II. The effect of repetition with color removed. Psychiat. Neurol., 1948, 116, 321-345.

Rosenblat, B., R.S. Bilger & R. Goldstein. Electrophysiologic responses to sound as a function of intensity, EEG pattern and sex. J. speech hear. Res., 1959, 2, 28-39.

Rosenzweig, S. Types of reaction to frustration: a heuristic classification. J. abnorm. soc. Psychol., 1934, 29, 298-300.

Rouke, F.L. & J. F. Kubis. Studies of the detection of deception: determination of guilt or innocence from psychogalvanic records of delinquent and non-delinquents. Amer. Psychologist, 1948, 3, 255.

Ruesch, J. Personality structure, lactic acid production and work performance in psychiatric patients. J. Psychol., 1945, 20, 381-390.

Ruesch, J. Psychophysiological relations in cases with head injuries. Psychosom. Med., 1945, 7, 158-168.

Ryan, A.H. & E. L. Ranseen. Skin resistance during a standard period of controlled muscular activity as a measure of physical fitness and fatigue. Amer. J. Physiol., 1944, 142, 68-79.

Sargent, S.S. Reaction to frustration- a critique and hypothesis. Psychol Rev., 1948, 55, 108-114.

Schiff, E., C Dugan & L. Welch. The conditioned PGR and the EEG as indicators of anxiety. J. abnorm. soc. Psychol., 1949, 44, 549-552.

Schlosberg, H. & W. C. Stanley. A simple test of the normality of 24 distributions of electrical skin conductance. Science, 1953, 117, 35-37.

Schlosberg, H. Three dimensions of emotion. Psychol. Rev., 1954, 61, 81-88.

Schoonhoven, G.O. PGR, blood pressure and pupil diameter. Master's thesis, Columbia Univ., 1925.

Schwartz, M.M. GSR accompanying the picture-frustration study. J. clin. Psychol., 1957, 13, 382-387.

Sears, A.B. & J. M. Beatty. A comparison of the GSR in the hypnotic and waking state. J. clin. exp. Hypnosis, 1956, 4, 49-60.

Sears, R.R. An experimental study of hypnotic anesthesia. J. exp. Psychol., 1932, 15, 1-22.

Sears, R.R. Psychogalvanic response in arithmetical work. Arch. Psychol., 1933, 155, 292.

Seward, J.P. & G. H. Seward. The effect of repetition on reaction to electric shock. Arch. Psychol., 1934, #168.

Seymour, R.B. Personality correlates of electrodermal resistance and response. Ph.D. thesis, Univ. of California, 1950.

Shackel, B. Diminishing the zero drift in recording D.C. from the human body surface. Quart. J. exp. Psychol., 1957, 9, 109-110.

Shackel, B. Skin-drilling: a method of diminishing galvanic skin potentials. Amer. J. Psychol., 1957, 72, 144.

Shaklee, A.B. Measurement of cutaneous electrical thresholds in animal research. Amer. J. Psychol., 1957, 70, 624-627.

Sherman, M. & H. Jost. Frustration reactions in normals and neurotic persons. J. Psychol., 1942, 13, 3-19.

Sherman, M. & H. Jost. Diagnosis of juvenile psychoses. Amer. J. Dis. Child., 1943, 65, 586-592.

Shirokov, A.A. The galvanic skin reflex in neurosis. Sovetsk. Psikhonevrol., 1937, 4, 62-72.

Shock, N.W. & C. H. Coombs. Changes in skin resistance and affective tone. Amer. J. Psychol., 1937, 49, 611-620.

Shteingart, K.M. Method of studying the skin galvanic reflexes by means of a new registration device. Zh. vyssh. neron. Deiatel'., 1955, 5 (5) 756-758.

Sidio, B. & L. Nelson. The nature and causation of the galvanic phenomena. Psychol. Rev., 1910, 17, 98-146.

Silkett, A.F. & M. A. Driscoll. Simple circuit for measuring variations in electrical resistance of a human being under emotional stress. Trans. Ill. Acad. Sci., 1949, 42, 128-129.

Silverman, J.J. & V. E. Powell. Studies on palmar sweating. I.A. technique for the study of palmar sweating. Amer. J. med. Sci., 1944, 208, 297-305.

Silverman, R.E. Eliminating a conditioned GSR by the reduction of experimental anxiety. J. exp. Psychol., 1960, 59, 122-125.

Sines, J.O. Conflect-related stimuli as elicitors of selected physiological responses. J. proj. Tech., 1957, 21, 194-198.

Smith, R.A. An investigation of the relationship between physiological and cognitive measures to the affective response to color. Dissert. abstr., 1958, 19, 873.

Smith, W. The Measurement of Emotion. London: Paul, 1922.

Snider, L.B. A research method validating self-determination. In M.B. Arnold & J. A. Gasson (Eds.), The Human Person. New York: Ronald Press, 1954.

Sokolov, E.N. & M. B. Mikhalevskaia. Study of the indications of thresholds reactions produced by signaling photic stimuli. Vop. Pskhol., 1949, 5 (3), 78-90.

Solomon, R.L. & L. C. Wynne. Traumatic avoidance learning. Psychol. Rev., 1954, 61, 353-385.

Spiegel, R. Specific problems of communication in psychiatric conditions. In S. Arieti (Ed.), American Handbook of Psychiatry. New York: Basic Books, 1959.

Stanley, W.C. & H. Schlosberg. The psychophysiological effects of tea. Dissert. Psychol., 1953, 36, 435-448.

Starch, D. Mental processes and concommitant galvanometric changes. Psychol. Rev., 1910, 17, 19-36.

Staudt, V. & J. Kubis. The psychogalvanic response and its relation to changes in tension and relaxation. J. Psychol., 1948, 25, 443-453.

Steinberg, A. An experimental investigation of the relation of GSR to Rorschach shock. Ph.D. thesis, Boston Univ., 1949.

Stevens, S.S. Mathematics, measurement and psychophysics. In S.S. Stevens, (Ed.), Handbook of Experimental Psychology. New York: Wiley, 1951 (b)., 1-49.

Stewart, K.C. A new instrument for detecting the GSR. J. speech hear. Disorders, 1954, 19, 169-173.

Stewart, K.C. Some basic considerations in applying the GSR technique to the measurement of auditory sensitivity. J. speech hear. Disorders, 1954, 19, 174-183.

Stewart, M.A., G. Winokur, J. A. Stern, S. B. Goze, E. Pfeiffer & F. Nornung. Adaptation and conditioning of GSR in psychiatric patients. J. ment. Sci., 1959, 105, 1102-1111.

Stukat, K.G. Suggestability: a factorial and experimental analysis. Almqvist & Wiksell, 1958, 248 p., Sw. ki. 25, Stockholm.

Sutton, J.T. Verbal learning, palmar skin conductance and response latency as a function of interlist stimulus similarity and warming-up. Dissert. abstr., 1958, 18, 2232.

Switzer, S.A. Disinhibition of the conditioned galvanic skin response. J. genl. Psychol., 1933, 9, 77-100.

Syz, H.C. Observations on the unreliability of subjective reports of emotional reactions. Br. J. Psychol., 1926, 17, 119-126 (b).

Syz, H. C. & E. F. Kinder. Electrical skin resistance in normal and psychotic subjects. Arch. neu. Psychiat., 1928, 19, 1026-1035.

Tamkin, A.S. An evaluation of the construct validity of Barron's Ego-Strength Scale. J. clin. Psychol., 1957, 13, 156-158.

Tarchanoff, J. Ueber die galvanischen Erscheinungen in der Haut des Menschen bei Reizungen der Sinnesorgane und bei verschiedenen Formen der psychischen Thaetigkeit. Pflug Arch. ges. Phys., 1890, 46, 46-55.

Taylor, J.A. A personality scale of manifest anxiety. J. abnorm. soc. Psychol., 1953, 48, 285-290.

Taylor, W.M. Comparison of galvanic after-changes with skin temperature changes following emotion-provoking stimuli. Master's thesis, Purdue Univ., 1950.

Terekhova, O.P. The orienting reflex in a conditioned motor reaction to a complex stimulus. Vop. Psikhol., 1958, 4, (1), 87-96.

Thetford, W.N. The measurement of physiological responses to frustration before and after non-directive psychotherapy. Unpublished doctor's dissert., Univ. Chicago, 1949.

Thetford, W.N. An objective measurement of frustration tolerance in evaluating psychotherapy. In W. Wolff and J. A. Precker (Eds.), Success in Psychotherapy, Pers. Monogr., 1952, 3, 26-62.

Thiesen, J.W. & R. K. Meister. A laboratory investigation of measures of frustration tolerance of pre-adolescent children. J. genet. Psychol., 1949, 75, 277-291.

Thouless, R.H. The PGR as preparedness to react. Br. J. Psychol., 1925, 16, 5-15.

Thouless, R.H. The PGR and the polarization theory. Internatl. Cong. Psychol., 1929, 9, 432-433.

Thouless, R.H. The techniques of experimentation of the psychogalvanic reflex phenomenon. Br. J. Psychol., 20, 219-240 & 309-321.

Thurstone, L.L. Multiple Factor Analysis. Chicago: Univ. of Chicago Press, 1947.

Traxel, W. About the time measure of the PGR. Z. Psychol., 1957, 161, 282-291.

Traxel, W. & G. Wrede. Changes in GSR while listening to music. Z. exp. angew. Psychol., 1959, 6, 293-309.

Truax, C.B. The repression response to implied failure as a function of the hysteria-psychasthenia index. J. abnorm. soc. Psychol., 1957, 55, 188-194.

Trueblood, H. & W. Grings. A DC amplifier for GSR and low-frequency potential measurement. J. Psychol., 1950, 30, 401-403.

Turner, M. The electrodermogram as a technique of study of the emotional periferic answer, the PGR. Rev. Neuro-Psiquiat, Lima, 1954, 17, 235-239.

Turner, M., E. Berard, N. Turner, N. Franco. Electroencephalagraphic, electrographic and electromyographic changes provoked by chlorpromazine in man. EEG clin. Neuroph., 1956, 8, 25-34.

Uhlenbruck, P. Measurement of PGR and vasoconstriction. Z. Biol., 1924, 81, 51-56.

Uruno, F. & A. Tago. A study on the measurement of the psychogalvanic reflex. Jap. J. Psychol., 1954, 25, 118-124.

Vail, C.M. Some verbal behavior correlates of the learning of the GSR: a study in the psychology of language with special emphasis on time pattern in spontaneous verbal expression. Dissert. abstr., 1955, 15, 539.

Van de Castle, R.L. The relationship of anxiety and repression to perceptual predominance of threatening stimuli. Ph.D. dissert., Univ. North Carolina, 1958.

Van der Valk. J.M. & J. Groen. Electrical resistance of the skin during induced emotional stress. Psych. Med., 1950, 12, 303-314.

Van der Valk, J.M. & J. Groen. An investigation of the electrical resistance of the skin during induced emotional stress in normal individual and in patients with internal diseases. Res. Publ. Ass. nerv. ment. Dis., 1950, 29, 279-296.

Vassiliou, V. Motivational patterns of two clinical groups as revealed by TAT sequence analysis. Ph.D. dissert., June, 1962.

Veinger, R.A. On the arousal of the skin-galvanic reflex with visual and auditory stimulations in children in postnatal ontogenesis. Fiziol. Zh. SSSR., 1950, 36, 653-659.

Venables, P.H. The relationships between PGR scores and temperature and humidity. Quart. J. exp. Psychol., 1955, 7, 12-18.

Venables, P.H. Some findings on the relationship between GSR and motor task performance. J. gen. Psychol., 1956, 55, 199-202.

Veraguth, O. Das psychogalvanische Reflexphanomen. Kong. exp. Psychol., Ber., 1906, 2, 219-224.

Vigouroux, R. PGR in hyperthyroidism. Soc. Biol. C.R., 1879, 31, 336-339.

Vinar, O. Analogies between schizophrenic illnesses and the L.S.D. 25 psychosis. Psychiat. neurol. med. Psychol., Leipzig, 1958, 10, 162-166.

Wagner, H.N., Jr. Objective testing of vision with use of the GSR. Arch. Ophthal., Chi., 1950, 43, 529-536.

Waller, A.D. Concerning emotive phenomena. I. Periodic variations of conductance of the palm of the human hand. II. The influence of drugs upon the electrical conductivity of the palm of the hand. R. soc. Lond. Proc. B., 1919, 91, 17-31.

Walter, W.G. The Living Brain. New York: W. W. Norton, 1953.

Wang, G.H. The GSR: a review of old and recent works from a physiologic point of view. Amer. J. physiol., Med., 1957, 36, 295-320.

Wang, G.H. & V.W. Brown. Terminal rebound of GSR in anesthetized cats. J. Neurophysiol., 1957, 20, 340-346.

Wang, G.H. & V.W. Brown. Changes in GSR after acute spinal transection in normal and decerebrate cats. J. Neurophysiol., 1956, 19, 446-451.

Wang, G.H. & T. W. Lu. PGR and motor area stimulation of cats. Chinese J. Physiol., 1930, 4, 174-182; 303-326.

Wang, G.H., J.G. Pan & T. W. Lu. The GSR in normal thalamic decerebrated and spinal cats under anaesthesia. Chinese J. Physiol., 1929, 3, 109-122.

Wang, G.H. & C. P. Richter. Action currents from cat's foot produced by stimulation of tuber cinereum. Chinese J. Physiol., 1928, 2, 279-284.

Wang, G.H., P. Stein & V.W. Brown. Effects of transections of central neuraxis of GSR in anesthetized cats. J. Neurophysiol., 1956, 19, 340-349.

Wang, G.H., P. Stein & V. W. Brown. Brainstem reticular systems and GSR in acute decerebrate cats. J. Neurophysiol., 1956, 19, 350-355.

Warn, L.J. A comparative investigation of dependency in epilepsy, paraplegia and tuberculosis. Ph.D. dissert., Univ. California, 1958.

Wechsler, D. The measurement of emotional reaction. Arch. Psychol., 1925, #76.

Weisgerber, C.A. Conscious perseveration and the persistence of autonomic activity as measured by recovery from the psychogalvanic response. J. gen. Psychol., 1951, 45, 83-93.

Weisgerber, C.A. The relationship of perseveration to a number of personality traits and to adjustment. J. gen. Psychol., 1954, 50, 3-13.

Welch, L. & J. Kubis. Conditioned PGR in states of pathological anxiety. J. nerv. ment. Dis., 1947, 105, 372-381.

Wells, F.L. & A. Forbes. On certain electrical processes in the human body and their relations to emotional reactions. Arch. Psychol., 1911, #16.

Wells, H.M. A note on the psychological significance of the psychogalvanic reaction. Br. J. Psychol., 1924, 14, 300-308.

Welsh, G.S. An anxiety index and an internalization ratio for the MMPI. J. consult. Psychol., 1952, 16, 65-72.

Welsh, G.S. Factor dimensions A and R. In G.S. Welsh and W. G. Dahlstrom (Eds.), Basic Readings on the MMPI in Psychology and Medicine. Minneapolis: Univ. Minnesota Press, 1956.

Welsh, G.S. Factor dimensions of the MMPI. Mimeographed materials. Chapel Hill: Univ. North Carolina, 1954.

Wenger, M.A. & J.C. Gilchrist. A comparison of two indices of palmar sweating. J. exp. Psychol., 1948, 38, 757-761.

West, L.J., K. C. Niell & J. D. Hardy. Effects of hypnotic suggestion on pain perception and GSR. AMA Arch. neurol. Psychol., 1952, 68, 549-560.

Wheeler, W.M., K. B. Little & G.F.J. Lehner. The internal structure of the MMPI. J. consult. Psychol., 1951, 15, 134-141.

Whelan, F.G. An instrument for use in measuring electrical resistance of the skin. Science, 1950, 3, 496-497.

White, C.T. & H. Schlosberg. Degree of conditioning of the GSR as a function of the period of delay. J. exp. Psychol., 1952, 43, 357-362.

Wickens, D.D., H.M. Schroder & J. D. Snide. Primary stimulus generalization of the GSR under two conditions. J. exp. Psychol., 1954, 47, 52-56.

Wiener, G., M.M. Salpeter, E. Tobach, E. Wineburg and L. Welch. The effect of the experimental situation on the amplitude of the psychogalvanic response in humans. J. gen. Psychol., 1952, 47, 213-225.

Wilcott, R.C., C. W. Darrow & A. Siegel. Uniphasic wave forms of skin potential response. J. compar. Physiol., 1957, 50, 217-219.

Williams, G. Manifest anxiety scale and the Herr-Kobler PGR Test. Master's thesis, Loyola Univ., Chicago, 1960.

Williams, G. An investigation of the comparative efficiency of the MMPI and the TAT in predicting success in nurses' training. Doctoral dissert., Loyola Univ., Chicago, 1963.

Woodworth, R.S. Experimental Psychology. New York: Holt, 1938.

Woodworth, R.S. & H. Schlosberg. Experimental Psychology. (rev. edit.). New York: Holt, 1954.

Yamaguchi, H.G., C.L. Hull, J. M. Felsinger & A. E. Gladstone. Characteristics of dispersions based on the pooled momentary reaction potentials of a group. Psychol. Rev., 1948, 55, 216-238.

Var.	VARIABLE AVERAGE	STANDARD DEV.	Scale	Test
1.	90.08333	15.43081	IR	MMPI.
2.	15.28333	12.83496	FaPaSc	
3.	61.78333	22.31598	AI	
4.	15.48333	9.77665	CI	
5.	94.93333	21.73543	Sarx	
6.	60.21666	25.41265	E	H.K. P.G.R.
7.	115.53333	48.53846	RT	
8.	102.10000	55.92068	PGRR	
9.	59.78333	24.83350	B/TR	
10.	95.78333	65.07920	R_{21}	
11.	9.46666	6.35994	Sc	TAT
12.	6.88333	6.74065	Pd	
13.	16.76666	10.13634	TAT	

TABLE 1. MEANS AND STANDARD DEVIATIONS OF THE FIRST 13 VARIABLES FROM MMPI, H.K PGR, AND TAT.

	1	2	3	4	5	6	7	8	9	10	11	12
1												
2	-.034											
3	.570	.556										
4	-.092	.901	.509									
5	.733	.092	.513	-.018								
6	.084	-.259	-.241	-.195	.051							
7	-.107	.131	.242	.135	.036	-.316						
8	-.247	.062	-.058	.179	-.276	.040	.097					
9	.037	-.187	-.062	-.178	-.105	.219	-.034	.178				
10	.051	-.062	-.157	-.108	.083	-.071	-.052	-.227	-.181			
11	-.204	.313	.126	.324	-.054	-.050	.222	.013	-.123	-.094		
12	-.325	.114	-.069	.112	-.350	-.133	.084	.087	-.067	-.081	.125	
13	.367	-.271	.032	-.325	.285	.085	-.170	-.133	.075	.019	-.532	-.574

TABLE 2. CORRELATION MATRIX OF 13 VARIABLES FOR FIRST FACTOR ANALYSIS.

VARIABLE	FACTOR NUMBERS 1	2	3	4	COMMUNALITIES
1	.534	-.570	-.010	.231	.830
2	.624	.590	.220	.224	.850
3	.824	.122	.180	.081	.752
4	.539	.634	.300	.210	.820
5	.646	-.494	.110	.161	.750
6	-.245	.304	-.240	.110	.230
7	.200	.320	-.233	.310	.210
8	-.162	-.290	.340	-.191	.302
9	-.211	.100	-.360	-.134	.242
10	-.001	.175	.310	-.152	.243
11	.185	.444	-.194	.162	.272
12	-.310	-.520	-.110	-.492	.490
13.	.103	-.670	-.324	-.220	.564

TABLE 3. CENTROID METHOD SOLUTION IN 4 FACTORS OF FIRST FACTOR ANALYSIS

VARIABLE	$F_0 \Lambda_{07} = V_7$			
	A_2	B_2	C_2	D_2
1	.773	-.021	.069	.370
2	.146	.651	-.088	-.015
3	.598	.631	-.005	-.004
4	.043	.674	-.022	-.031
5	.796	.321	.158	-.011
6	-.347	-.227	-.275	-.009
7	.008	-.020	-.319	.147
8	-.001	.087	.413	-.040
9	-.192	-.290	-.345	-.176
10	-.135	.315	.198	-.176
11	-.084	.085	-.348	-.030
12	.054	-.293	.078	-.270
13	.449	-.330	-.092	-.007

TABLE 4. FACTOR LOADINGS AFTER RADIAL ROTATION TO STRUCTURE, 13 VARIABLES, 4 FACTORS OF FIRST FACTOR ANALYSIS.

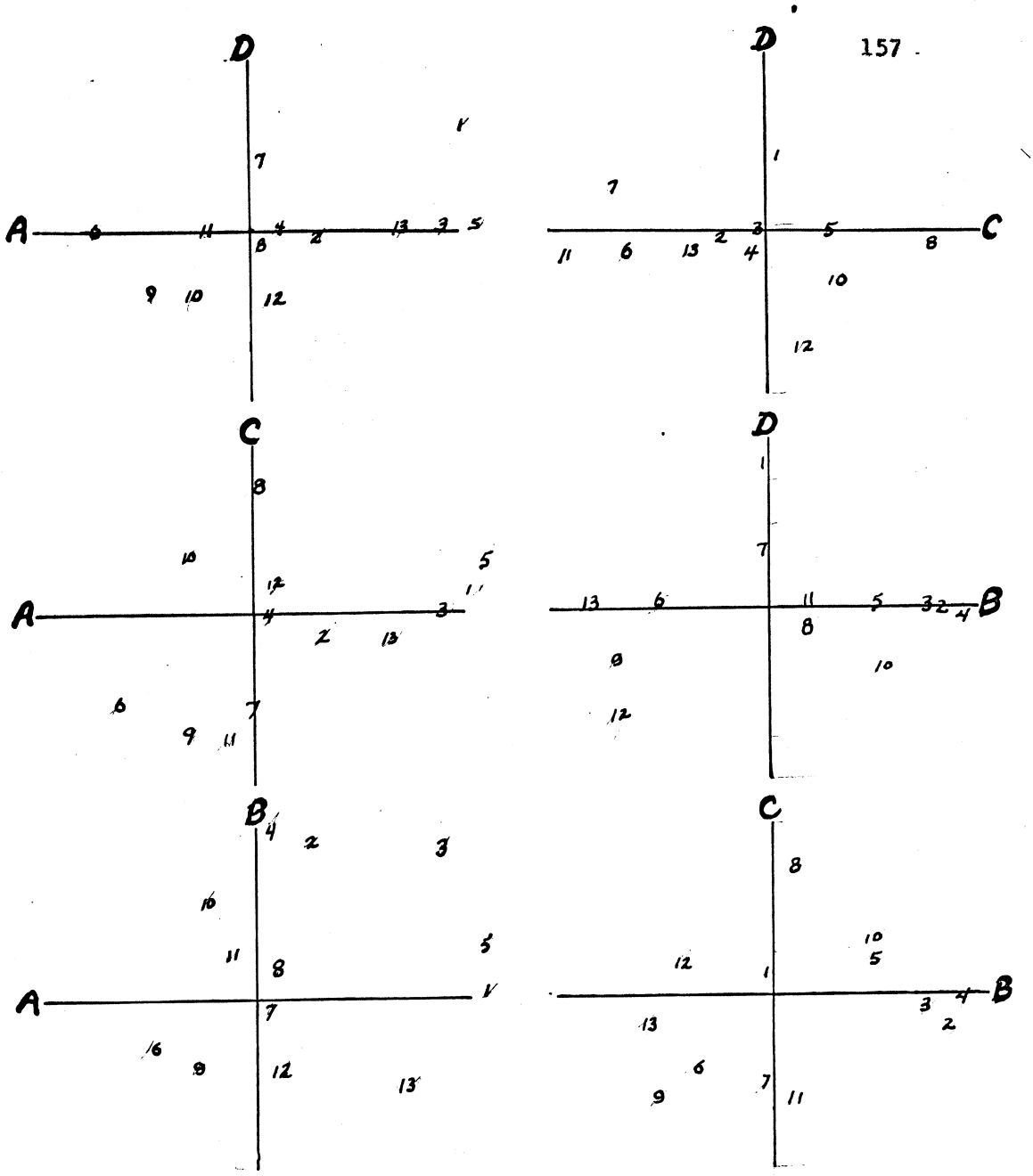


FIGURE 1. RADIAL ROTATION TO SIMPLE STRUCTURE FOR FIRST FACTOR ANALYSIS: VARIABLES 1-13

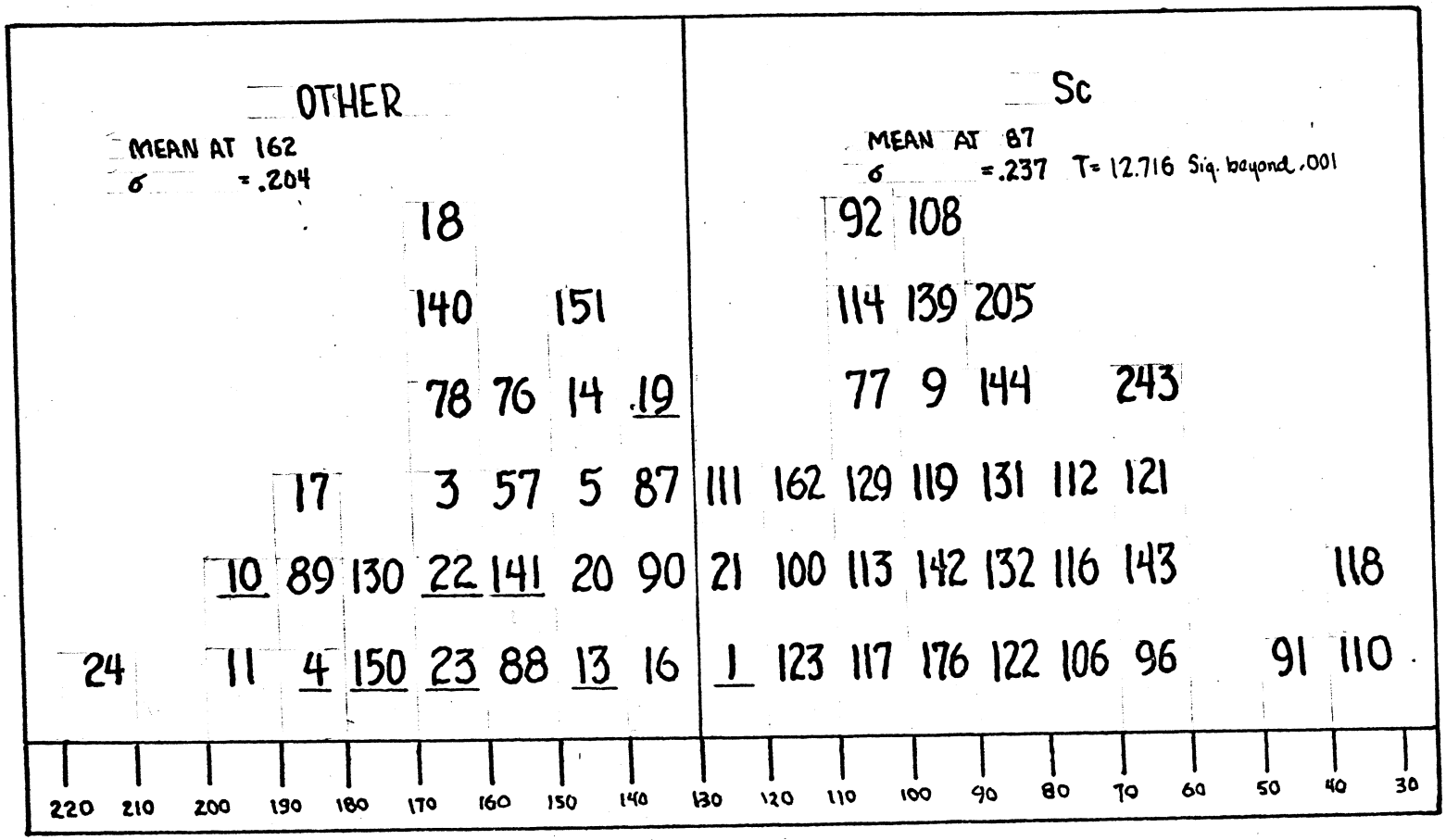


FIGURE 2A. DISCRIMINANT ANALYSIS ON SCHIZOID TENDENCY OR "B" FACTOR
(60 CASES LISTED BY CODE NO.)

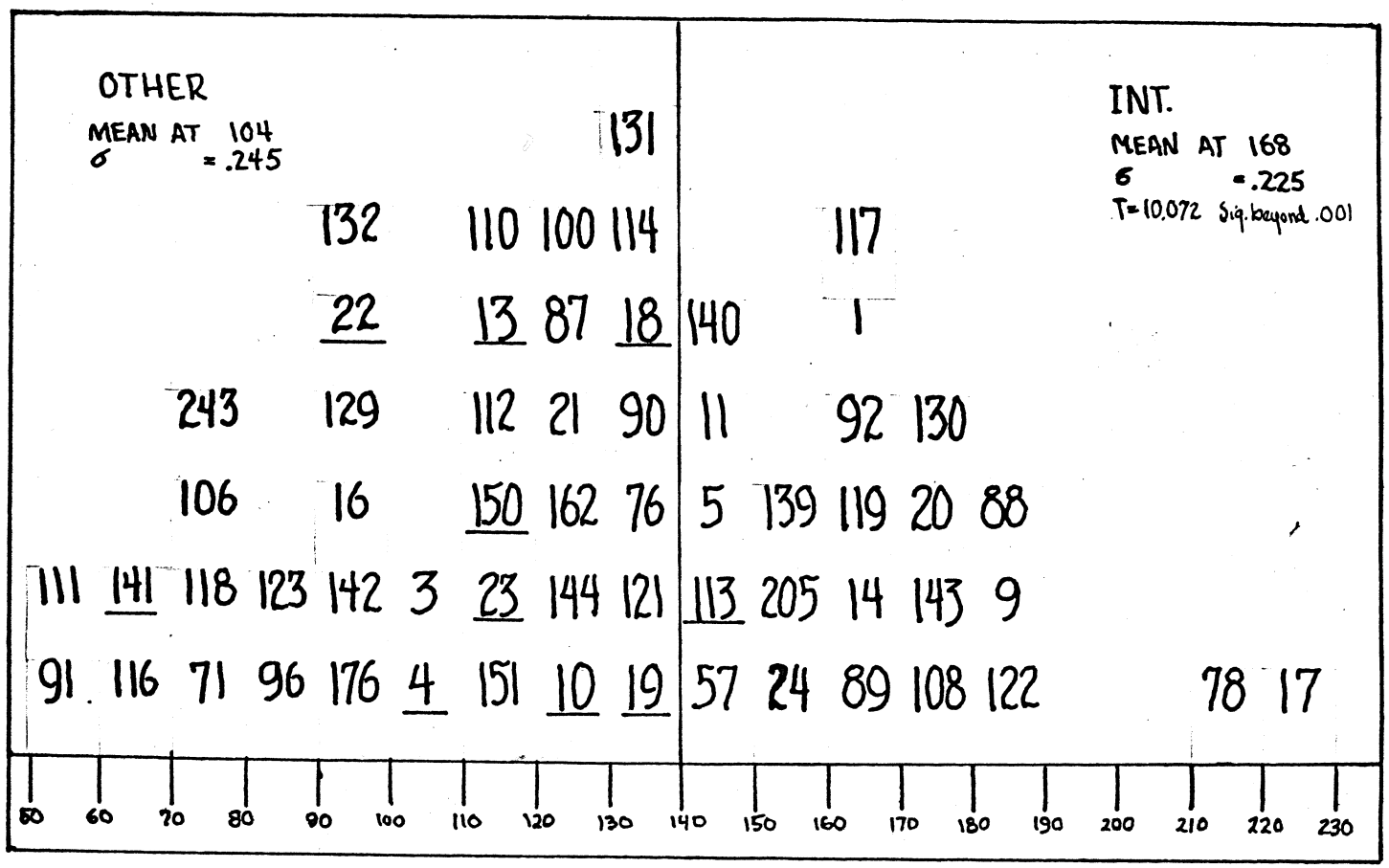


FIGURE 2B. DISCRIMINANT ANALYSIS ON INTERNALIZING USING FACTOR "A" (60 CASES LISTED BY CODE NO.)

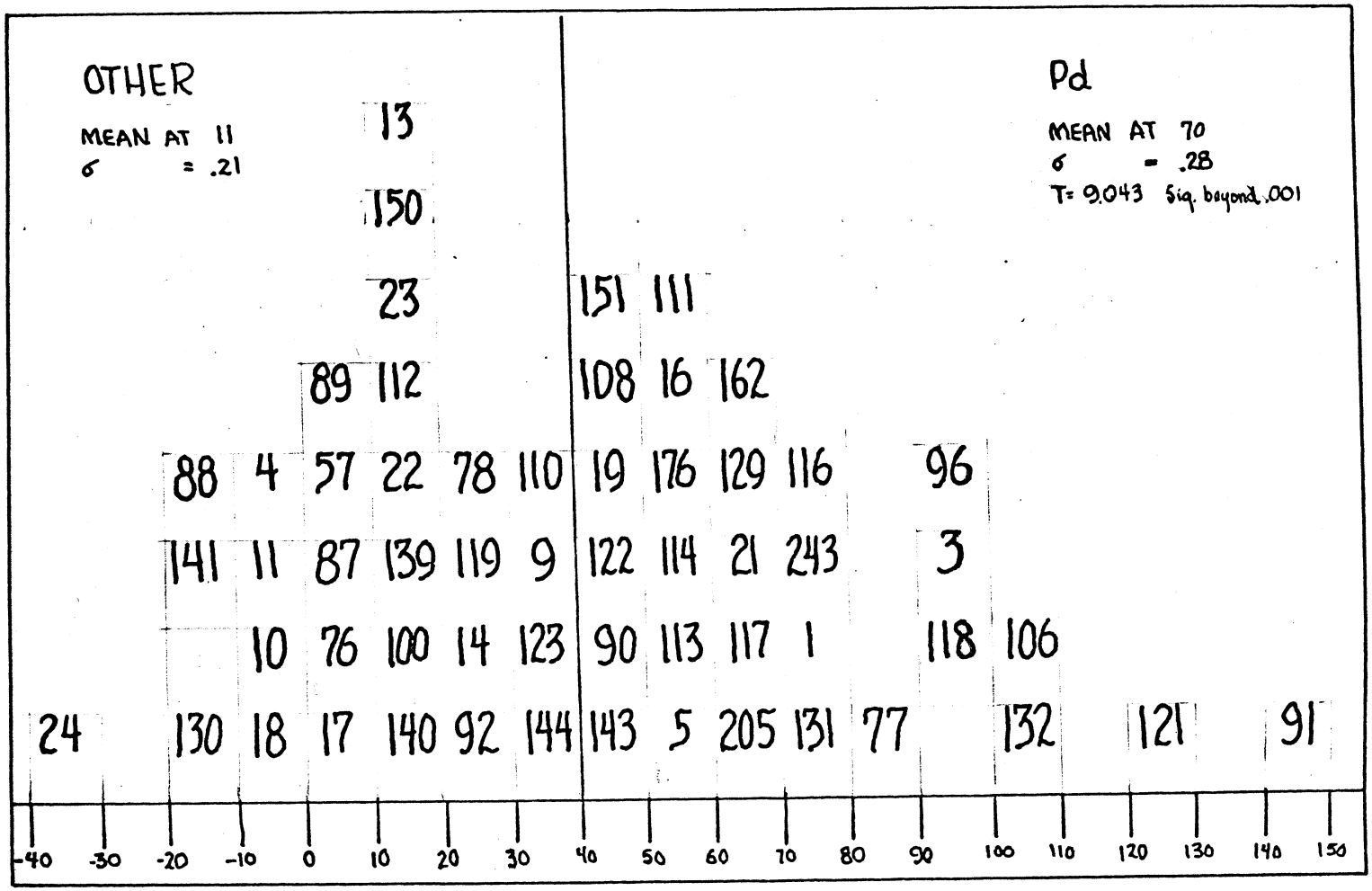


FIGURE 2c. DISCRIMINANT ANALYSIS ON PSYCHOPATHIC, ACTING OUT TENDENCY, USING FACTOR "C." (60 CASES LISTED BY CODE NO.)

$\Lambda'07\ \Lambda07 = C7$				
	A_2	B_2	C_2	D_2
A_2	1.000			
B_2	0.195	1.000		
C_2	-0.008	0.359	1.000	
D_2	0.148	-0.367	0.335	1.000

FIRST ANALYSIS - INTERCORRELATION MATRIX

$\Lambda'04\ \Lambda04 = C4$				
	A_2	B_2	C_2	D_2
A_2	1.000			
B_2	0.248	1.000		
C_2	-0.225	0.278	1.000	
D_2	-0.071	-0.114	-0.357	1.000

SECOND ANALYSIS - INTERCORRELATION MATRIX

TABLE 5.

VARIABLE	$F_0 \Lambda_{04} = V_4$ A	B	C	D
5	.094	.599	.766	-.236
6	-.352	-.274	.090	-.188
7	-.028	-.153	.132	.274
8	.151	.321	-.138	-.398
9	.055	-.084	-.226	-.339
10	.338	.251	-.047	-.268
11	-.133	-.039	.002	-.304
12	-.102	-.489	.175	-.026
13	-.615	-.593	-.212	.342
14	.752	.065	-.027	.404
15	.374	.640	-.009	-.002
16	.161	.545	.618	-.072
17	.282	-.368	-.056	.480
18	.129	.484	.693	-.169
19	.119	-.279	-.704	.073

TABLE 6. FACTOR LOADINGS AFTER RADIAL ROTATION TO STRUCTURE. 15 VARIABLES, 4 FACTORS OF SECOND FACTOR ANALYSIS.

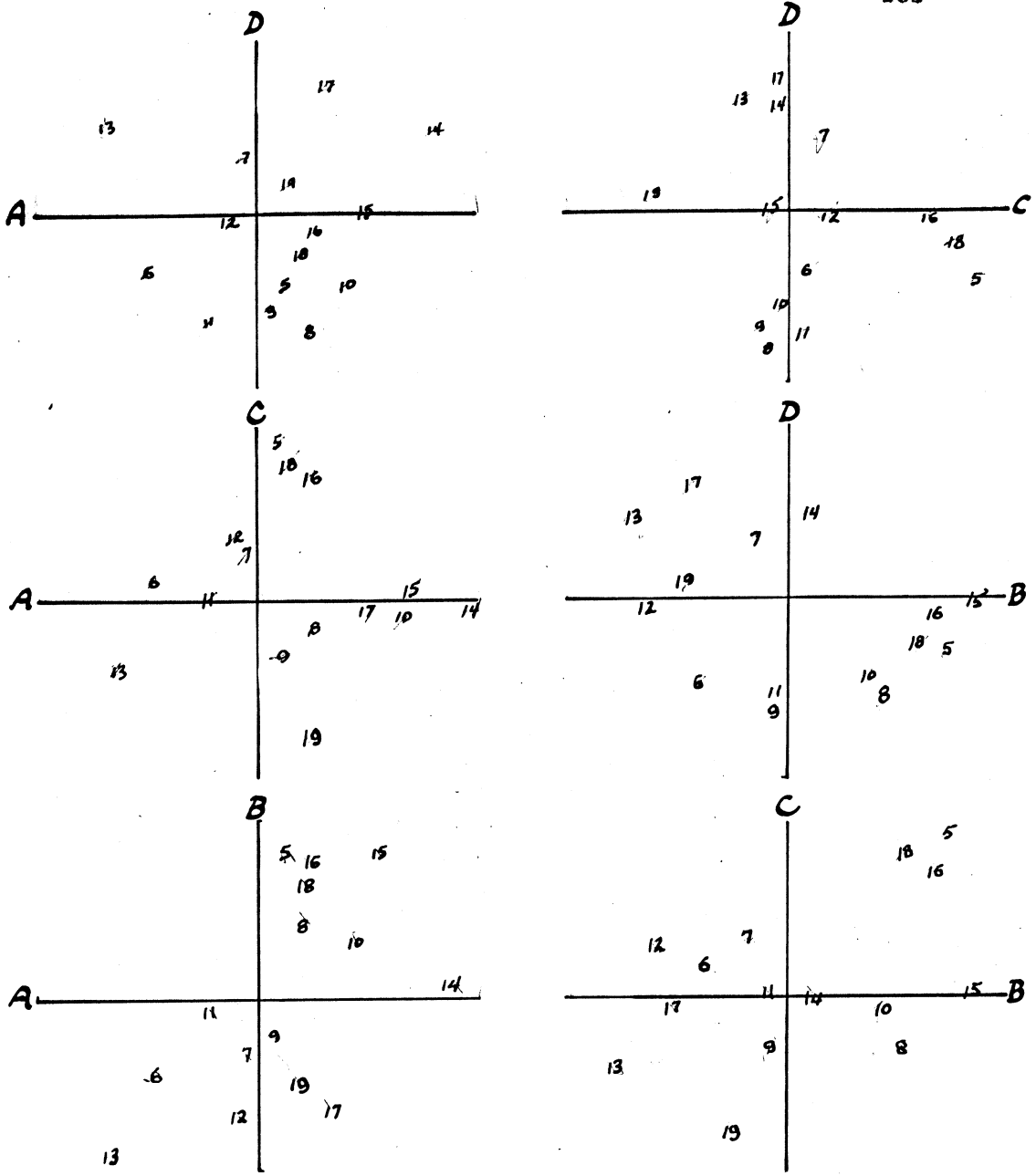


FIGURE 3. RADIAL ROTATION TO SIMPLE (OBLIQUE) STRUCTURE FOR SECOND FACTOR ANALYSIS: VARIABLES 5-19

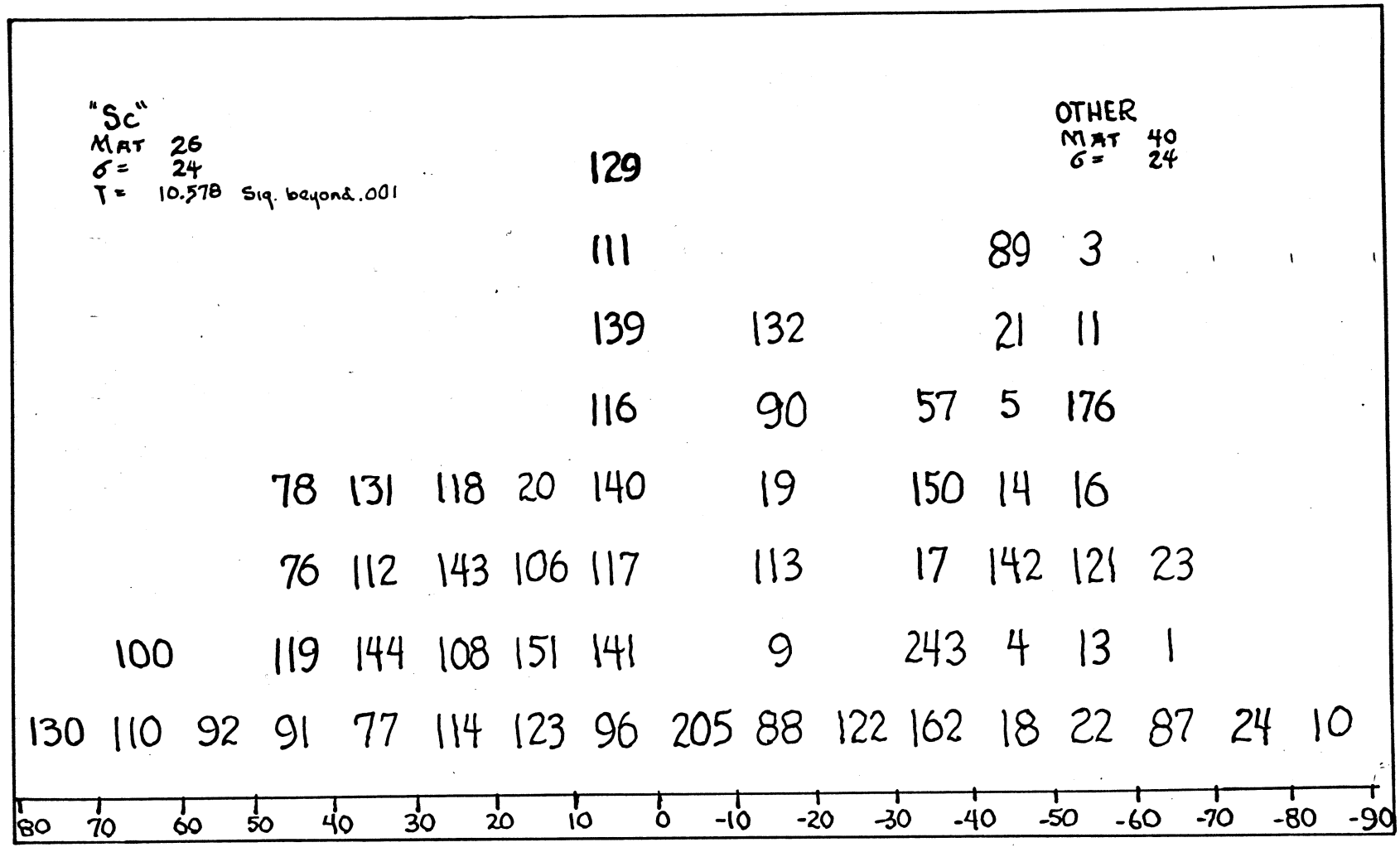


FIGURE 4A. DISCRIMINANT ANALYSIS FOR WELSH'S "ANXIETY", SECOND FACTOR ANALYSIS USING FACTOR I

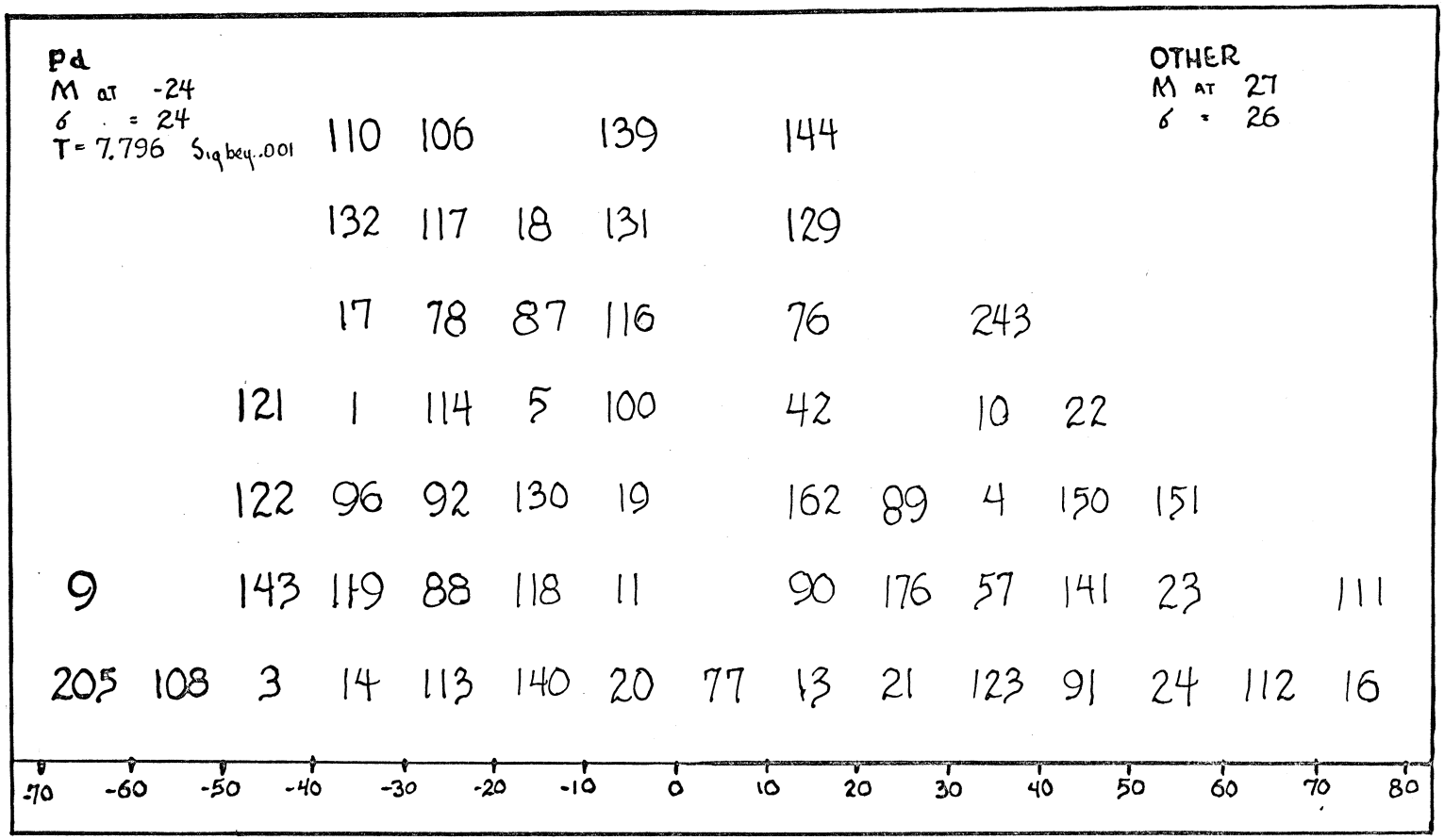


FIGURE 4 B. DISCRIMINANT ANALYSIS FOR PSYCHOPATHY OR WELSH'S "REPRESSION" SECOND FACTOR ANALYSIS USING FACTOR 2

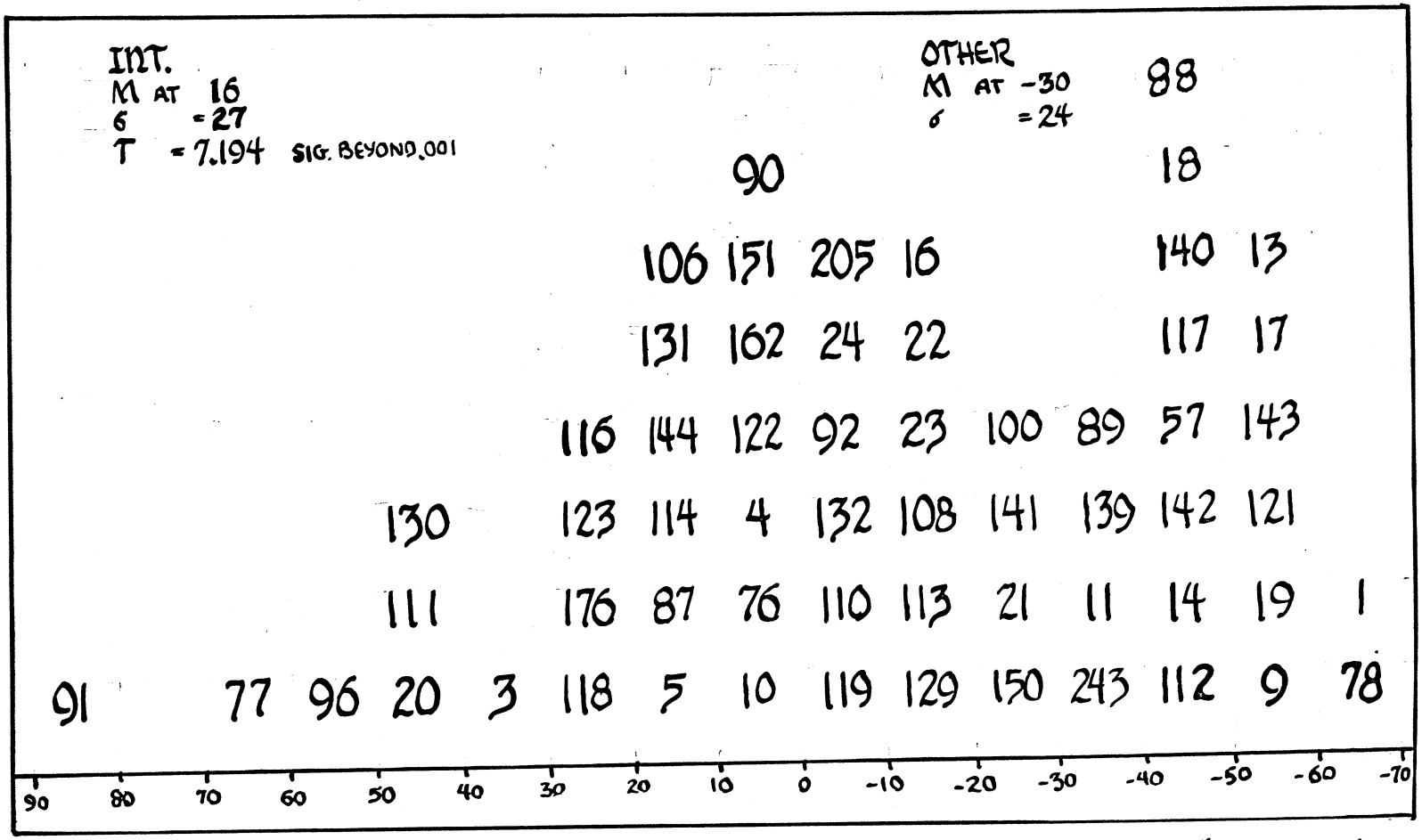


FIGURE 4C. DISCRIMINANT ANALYSIS PERFORMED FOR WELSH'S "CONTROL" SECOND FACTOR ANALYSIS, USING FACTOR 3

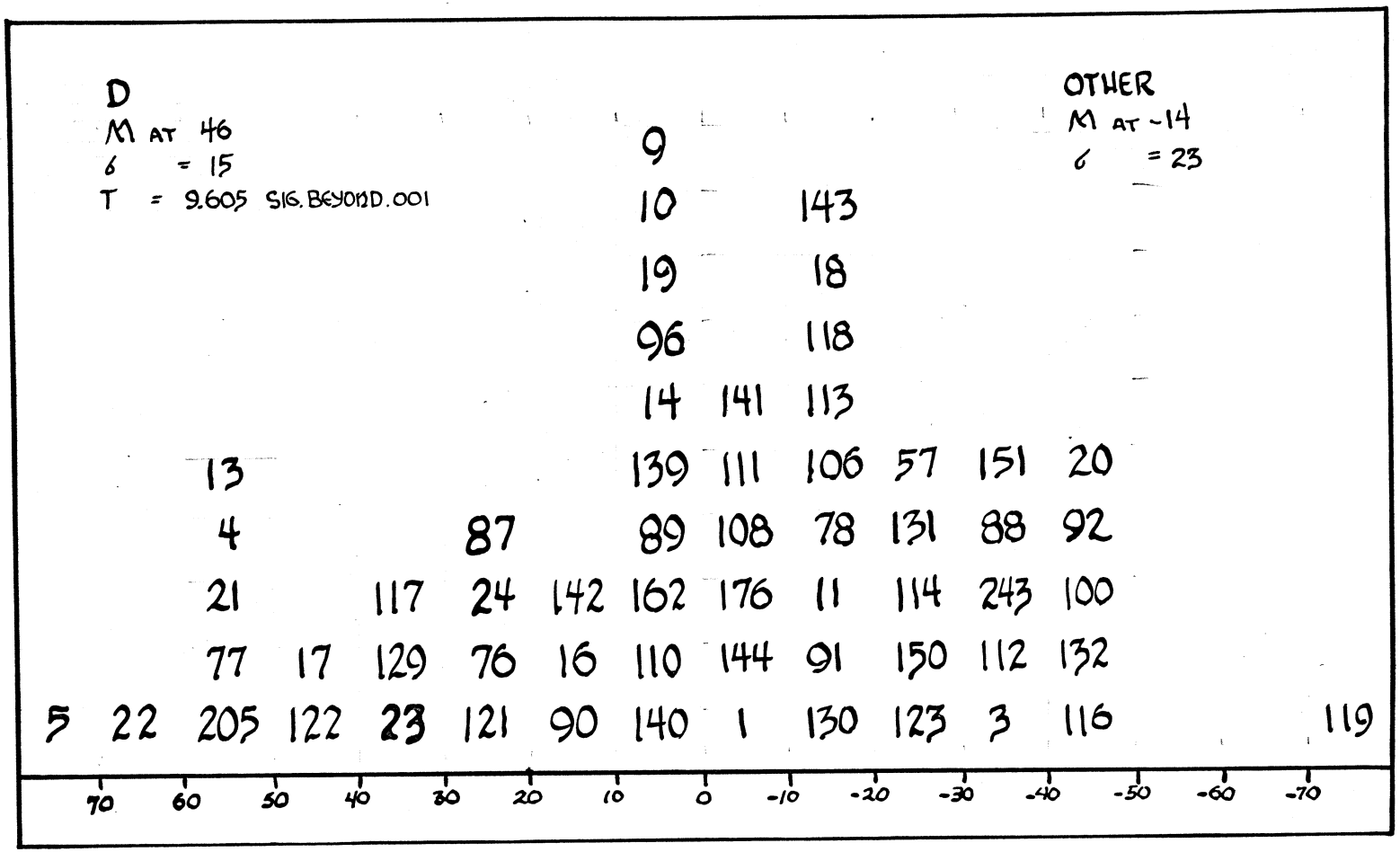


FIGURE 4D. DISCRIMINANT ANALYSIS AFTER 2ND FACTOR ANALYSIS USING FACTOR 4, MANIC, DEPRESSIVE, COMPULSIVE

SCHIZOID	PSYCHOPATHIC	INTERNALIZING	MANIC?
130	9	91	5
100	205	77	22
110	108	96	13
92	121	130	4
78	122	111	21
76	143	20	77
119	3	3	205
91	110	116	17
131	132	123	122
112	17	176	117
144	1	118	129
77	96	106	23
118	119	131	87
143	14	144	24
108	106	114	76
114	117	87	121
20	78	5	142
106	114	90	16
151	92	151	90
123	88	162	
129	113	122	
111	18	4	
139	87	76	
116	5	10	
140	130		
117	118		
141	140		
96	139		
	131		
	116		
	100		
	19		
	11		
	20		

	DELINQUENT	WORK. GIRLS	NUNS
Sc	68%	29%	4%
Pp	50%	21%	28%
Int	50%	29%	21%
Ma?	32%	21%	47%

TABLE 7. LISTING OF CASES BY CODE NUMBER IN ORDER OF FACTOR Z SCORES ASSIGNED THROUGH 2ND DISCRIMINANT ANALYSIS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	.00																		
2	-.04	.00																	
3	.57	.56	.00																
4	-.13	.90	.45	.00															
5	.70	.20	.60	.14	.00														
6	.08	-.26	-.24	-.14	.04	.00													
7	-.12	.12	.24	.10	.04	-.27	.00												
8	-.25	.06	-.06	.18	-.26	.04	.10	.00											
9	.03	-.19	.06	-.17	-.15	.22	-.02	.19	.00										
10	.05	-.06	-.16	-.08	.01	-.07	-.05	-.23	.18	.00									
11	-.21	.31	.13	.32	.02	-.05	.19	.01	.12	-.09	.00								
12	-.32	.11	-.07	.09	-.26	-.13	.16	.09	.07	-.08	-.13	.00							
13	.29	-.28	-.04	-.29	.04	.10	-.18	-.09	.11	.04	-.60	-.51	.00						
14	.29	.73	.72	.63	.52	-.14	.24	-.06	.19	-.16	.13	.22	-.28	.00					
15	.47	-.04	.28	-.21	.37	-.10	.08	-.41	.12	.18	.06	-.33	.24	-.09	.00				
16	.47	.42	.61	.33	.72	-.11	-.01	-.23	.22	.03	.10	-.19	-.02	.52	.31	.00			
17	-.29	.71	.34	.72	.01	-.22	.22	.17	.14	-.10	.33	.28	-.40	.64	-.30	.20	.00		
18	.67	.38	.67	.24	.70	.08	.09	-.24	.08	.04	.08	-.15	-.04	.60	.34	.54	.00	.00	
19	-.29	-.59	-.57	-.56	-.43	.17	-.16	.03	.19	.17	.00	-.08	.12	-.71	.02	-.30	-.43	-.49	.00
MEAN	90	15	62	16	93	60	117	102	59	95	9.5	7	17	53	48	16	13	16.5	50.5
S.D.	15.6	12.9	22.5	8.8	23.5	25.6	53.8	56.4	25.5	65.6	6.4	6.8	10.2	12.0	11.1	5.2	4.9	4.4	11.1
SE MEAN	2.0	1.7	2.9	1.1	3.0	3.3	7.0	7.3	3.3	8.5	0.8	0.9	1.3	1.5	1.4	0.7	0.6	0.6	1.4

TABLE 8. CORRELATION MATRIX, 19 VARIABLES

1. A = WELSH'S "ANXIETY" (Sc)
2. R = WELSH'S "REPRESSION" (Pd)
3. C = WELSH'S "CONTROL" (INT)
4. H - LOADED IN ARC, OR RC
5. E = EASY BALANCE
6. O = OTHER OR LEFTOVER

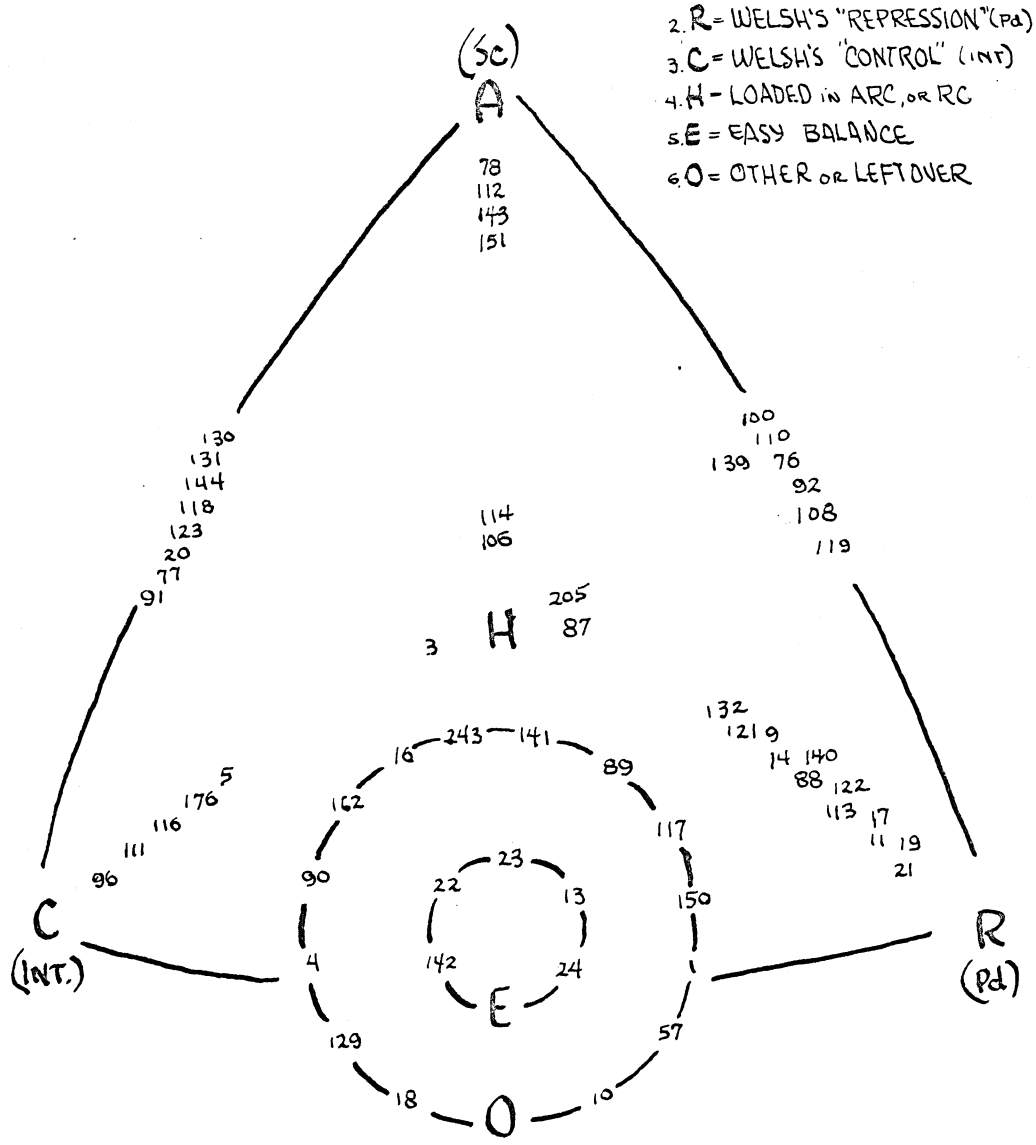
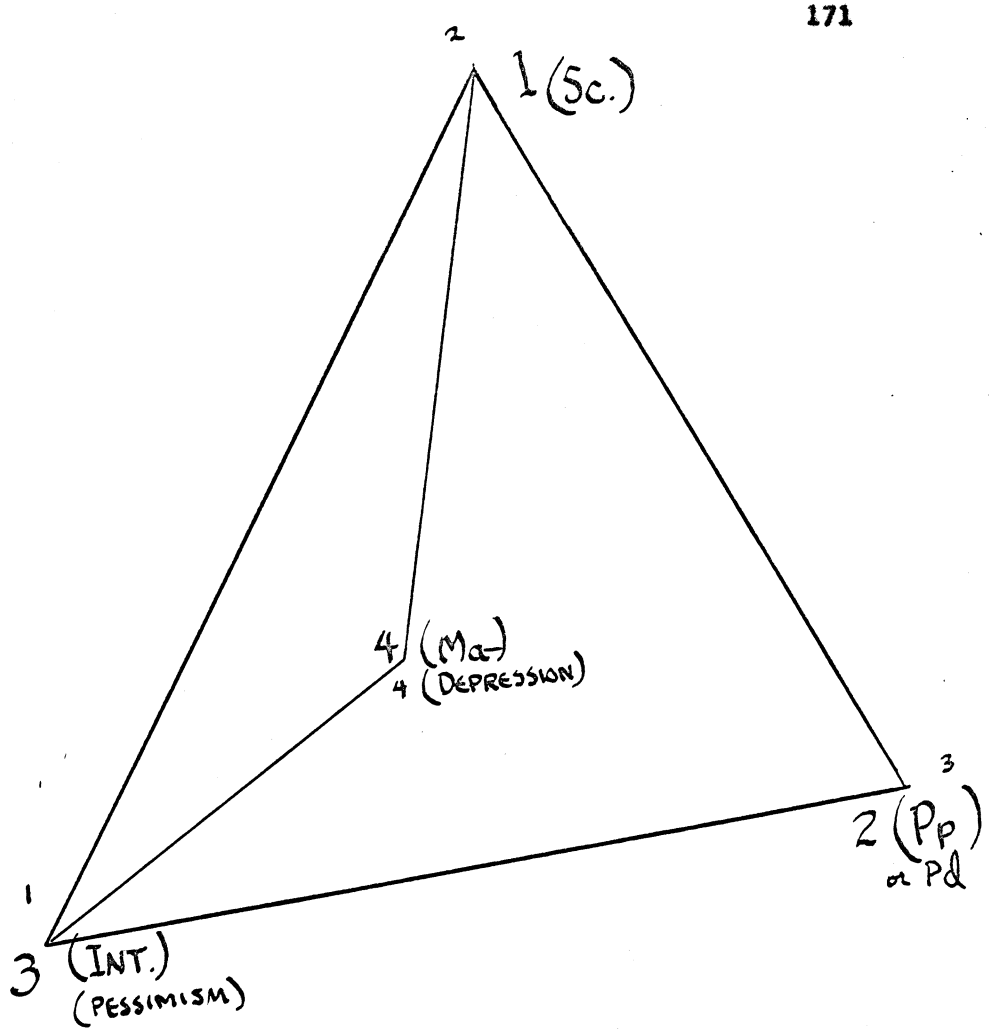


FIGURE 5. 60 CASES (BY CASE NO.) RELATED IN SPACE ACCORDING TO Z SCORES SELECTED AFTER FACTORING AND DISCRIMINANT ANALYSES



1,2,3,4 = FACTORS OF 1ST FACTOR ANALYSIS
1,2,3,4 = FACTORS OF 2ND FACTOR ANALYSIS

FIGURE 6. COMPARISON OF FACTOR SPACE AFTER TWO FACTOR ANALYSES

APPROVAL SHEET

The dissertation submitted by Robert E. Hoene, S.J. has been read and approved by five members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the dissertation is now given final approval with reference to content, form, and mechanical accuracy.

The dissertation is therefore accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

June 1963
Date

V. J. Herrell
Signature of Adviser